

FINAL SITE INSPECTION REPORT
FOR
ARMSTRONG WORLD INDUSTRIES (FORMER)
BRAINTREE, MASSACHUSETTS

CERCLIS NO. MAD001068154

SITE INSPECTION
RESPONSE ACTION CONTRACT (RAC), REGION I

Prepared for:

U.S. Environmental Protection Agency
Region I
Office of Site Remediation and Restoration
Boston, MA 02114-2023

EPA CONTRACT NO. 68-W6-0045
EPA WORK ASSIGNMENT NO. 032-SISI-01ZZ

TtNUS PROJECT NO. N0073-0800
TtNUS DOCUMENT NO. RI00506F

Submitted by:

Tetra Tech NUS, Inc.
55 Jonspin Road
Wilmington, MA 01887



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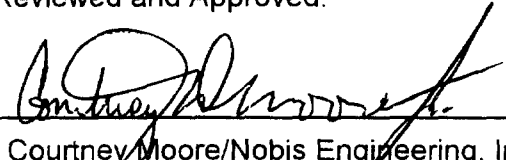
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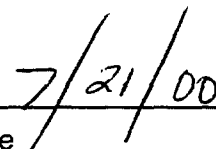
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July 2000

Tetra Tech NUS, Inc.
Reviewed and Approved:


Courtney Moore/Nobis Engineering, Inc.
Site Manager


Date 7/21/00


Janet Pillion/TtNUS
Project Manager

7-21-00
Date

EPA ID: MAD001068154 Site Name: ARMSTRONG WORLD INDUSTRIES INC (FMR)

State ID:

Alias Site Names: ARMSTRONG WORLD INDUSTRIES INC

City: BRAINTREE

County or Parish: NORFOLK

State: MA

Refer to Report Dated: 07/21/2000

Report Type: SITE INSPECTION 001

Report Developed by: HNUS

DECISION:

- ☐ 1. Further Remedial Site Assessment under CERCLA (Superfund) is not required because:
- ☐ 1a. Site does not qualify for further remedial site assessment under CERCLA (No Further Remedial Action Planned - NFRAP)
- ☐ 1b. Site may qualify for action, but is deferred to:
- ☒ 2. Further Assessment Needed Under CERCLA:
- 2a. Priority: ☐ Higher ☒ Lower
- 2b. Other: (recommended action) Low

DISCUSSION/RATIONALE:

Releases to groundwater, surface water (fishery, wetlands) and soil documented. No drinking water supplies are impacted.

Site Decision Made by: NANCY SMITH

Signature: _____

Nancy Smith

Date: 07/27/2000

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1.0 INTRODUCTION

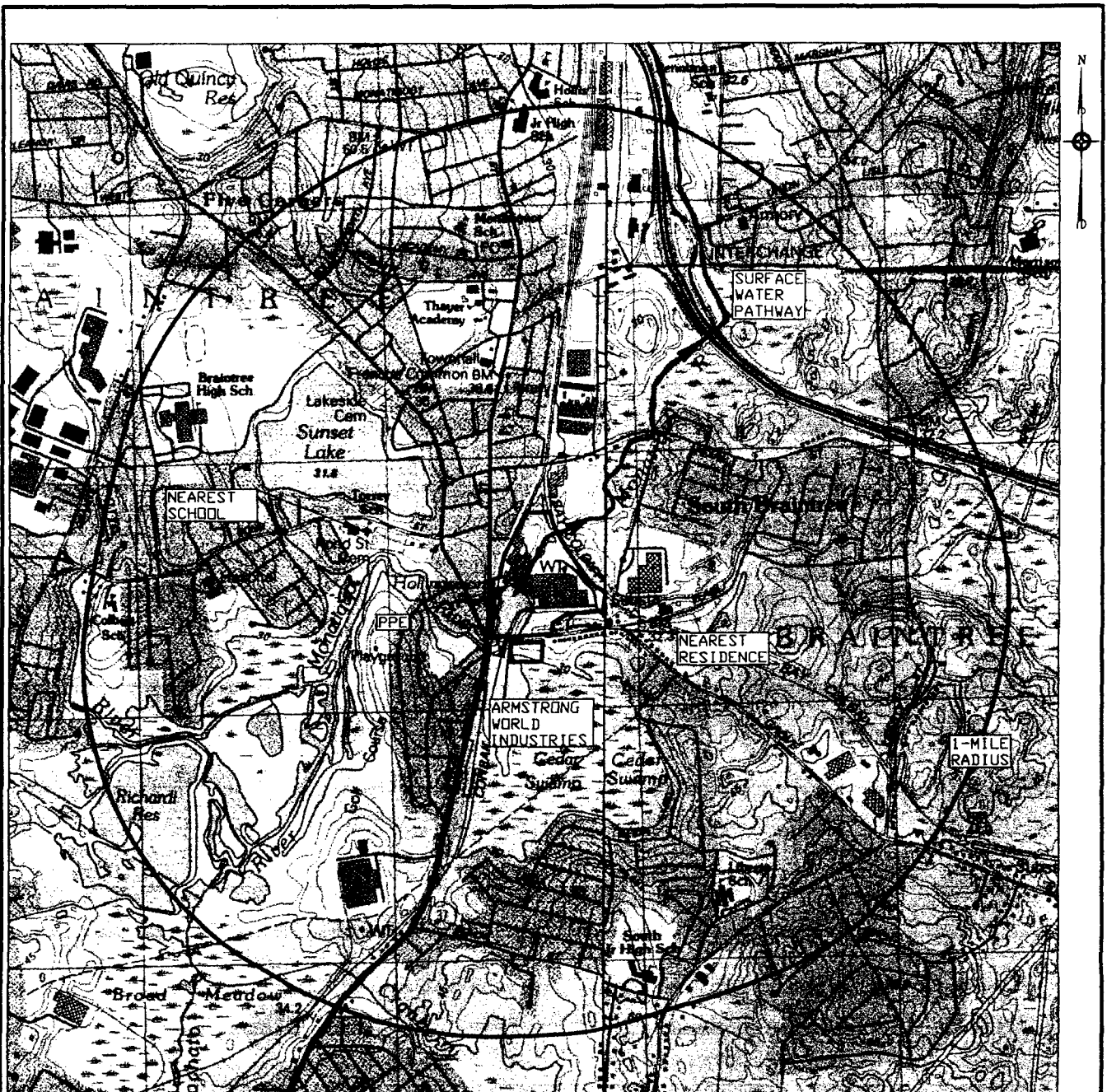
The U.S. Environmental Protection Agency (EPA) requested that Tetra Tech NUS, Inc. (TtNUS) perform a Site Inspection (SI) of the former Armstrong World Industries (AWI) property, located in Braintree, Massachusetts. This work was performed under Contract No. 68-W6-0045, and EPA Work Assignment No. 032-SISI-01ZZ. Tasks were conducted in accordance with the SI scope of work provided by EPA and the Draft Work Plan dated December 1998 submitted by TtNUS. A Preliminary Assessment (PA) report for the AWI property was not conducted by EPA.

Background information used in the generation of this report was obtained through file searches conducted at EPA, Massachusetts Department of Environmental Protection (MADEP), telephone interviews with town officials, conversations with persons knowledgeable of the AWI property, and conversations with other Federal, State, and local agencies.

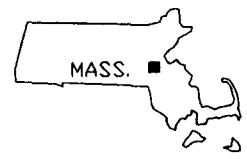
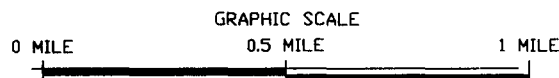
This report follows the guidelines developed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, commonly referred to as Superfund. However, these documents do not necessarily fulfill the requirements of other EPA Region I regulations such as those under the Resource Conservation and Recovery Act (RCRA) or other Federal, State, or local regulations. SIs are intended to provide a preliminary screening of sites to facilitate EPA Region I's assignment of site priorities. They are limited efforts and are not intended to supersede more detailed investigations.

2.0 SITE DESCRIPTION


The AWI property is located at 10 Plain Street in Braintree, Norfolk County, Massachusetts (MA). The geographic coordinates to the center of the AWI property is 42° 11' 55.0" north latitude and 71° 00' 15.0" west longitude (Figure 1) [16]. The AWI property is currently active and owned by 10 Plain Street, LLC Corporation. Petrini and Sons, Inc. manage the AWI property for the owner [43; 44]. The AWI property comprises approximately 35.3 acres and is identified on the Town of Braintree Assessor Maps 1031 and 1086 as lots 5, 23, and 24. AWI occupies 31.58 acres north of Plain Street. A portion of the site is located south of Plain Street. This parcel consists of 3.72 acres of undeveloped land which is also owned by Petrini and Sons, Inc. [2; 11; 20]. Hollingsworth Pond is located on the southwestern portion of the AWI property and drains into the Monaquot River, which flows north through the AWI property. The AWI property consists of three buildings (Figure 2) [11].



BASE MAP IS A PORTION OF THE FOLLOWING 7.5 X 15 MINUTE USGS QUADRANGLES:
 NORWOOD, MASSACHUSETTS, 1985; WEYMOUTH, MASSACHUSETTS, 1984



QUADRANGLE LOCATION

| | | | | |
|-------------------------------------|-----------------|------------|--|----------------------|
| SITE LOCUS | | | FIGURE 1 | |
| ARMSTRONG WORLD INDUSTRIES (FORMER) | | |  | TETRA TECH NUS, INC. |
| BRAINTREE, MASSACHUSETTS | | | | |
| DRAWN BY: | D.W. MACDOUGALL | REV.: | | |
| CHECKED BY: | C. MOORE | DATE: | JULY 20, 2000 | |
| SCALE: | AS NOTED | ACAD NAME: | DWG\SI\0800\FIG_1.DWG | |
| | | | 55 Jonspin Road Wilmington, MA 01887 (978)658-7899 | |

A two-story brick building is located north of the entrance to the AWI property and is occupied by Geo Labs. Towards the center and northwestern portion of the AWI property is the AWI building, which covers approximately 239,472 square feet of the AWI property. Most of the AWI building is currently vacant, except for the area towards the center of the AWI property. There are four tenants which utilize this area for warehouse space. The tenants include David Gooding Plumbing Supply Distributor, Hancock Paint Distributor, Logan Furniture distributor, and South Shore Warehousing. South of the AWI building, there is a small one-story office building occupied by Petrini Management [11].

The AWI property is bound by railroad tracks and Massachusetts Bay Transportation Authority (MBTA) property to the north, northeast, and west; John W. Mahar Highway to the east; and residences and Plain Street to the south [11]. The AWI property is zoned for industrial use [20].

3.0 OPERATIONAL AND REGULATORY HISTORY AND WASTE CHARACTERISTICS

Available file information indicates that the use of the AWI property extended back to 1643 when various types of iron products were produced by settlers in this area. In the late 1700s, a saw and gristmill was built on the AWI property. In the early 1800s, a copper foundry operated on the AWI property. In the early 1900s, the Monatiquot Rubber Works Company manufactured reclaimed rubber on 20 acres of the AWI property east of the Monatiquot River. The Mayflower Rubber Works, which manufactured rubber shoe products, was developed in 1911. In 1920, all operations on the AWI property were performed under the Monatiquot Rubber Works Company, which produced reinforced rubber flooring. The name of the company was changed in 1925 to the Stedman Rubber Flooring Company. The Armstrong Cork Company hired Stedman Rubber Flooring Company in 1934 to manufacture rubber floor tile. In 1936, Armstrong Cork Company purchased the AWI property and all operations under the Stedman Rubber Flooring Company [2]. Further information concerning AWI property ownership and prior operations was not included in available file information.

Armstrong Cork Company ceased rubber floor tile operations in the early 1960s, and began manufacturing industrial cork, rubber gaskets, textile cots, aprons, and armaflex insulation. These products were manufactured by Armstrong Cork Company on the AWI property until the mid 1990s [2]. Available file information did not indicate further details regarding operations on the AWI property from 1990 to 1996. In 1996, the AWI property was purchased by 10 Plain Street, LLC Corporation [20; 43; 44]. From 1996 to the present, a portion of the AWI building has been utilized as warehouse space. However, TtNUS team personnel were not granted access by the AWI property owner into the interior of the abandoned AWI building because the abandoned AWI building was dilapidated and not safe for entry. In addition, TtNUS team personnel were not granted access by the AWI property owner into the interior of the occupied areas of the AWI building due to lack of tenant notification [11].

Previous investigations of the AWI property by GEI Consultants, Inc. (GEI) have identified the following source areas east of the Monatiquot River on the AWI property: Fill Area #1, a former lagoon, and a former drum disposal area. The following source areas have been identified west of the Monatiquot River on the AWI property: Fill Area #2, Fill Area #3, a former dry well, and a former terra cotta drain pipe release [2].

From approximately 1946 to 1972, Fill Area #1 was used for the disposal of by-products of the cork, rubber, and textile manufacturing processes. Materials disposed of in Fill Area #1 during this time included empty drums, rubber/cork dust and sludge, textile materials, rubber mats, wooden pallets, waste mylar, rubber and cork gasket material, and armaflex [2]. Fill Area #1 covers approximately 73,000 square feet and is estimated by GEI to contain 47,000 cubic yards of fill [4; 21].

Fill Area #1 was also used for sludge dewatering from 1972 to 1983. Wet scrubbers were used to remove rubber/cork dust from the air and allow it to settle into tanks. The sludge was scraped off the surface of Fill Area #1 on a regular basis, placed in trucks and disposed of at an off-site landfill. Available file information did not indicate at which landfill the sludge was disposed. When the settling tanks were periodically repaired, a lagoon, approximately 100 feet long and 30 feet wide, located southeast of Fill Area #1, was used to store the discharge water from the scrubbing process. Available file information did not indicate how often the lagoon was utilized for storing the discharge water. The scrubber effluent was treated in settling tanks before it was pumped into the lagoon. Drainage from on-site chlorine and ammonia tanks from the manufacturing process was also discharged into the settling tanks and eventually into the lagoon. According to a GEI Notification of Release Report for AWI dated February 22, 1991, aerial photographs taken in 1965 and 1969 indicate the lagoon was partially filled with liquid. In 1983, the lagoon became inactive when AWI began to use a dry scrubber process [3; 4].

Fill Area #2 is composed of coal ash. Fill Area #3 is composed of sand and gravel with pieces of construction debris such as brick and asphalt [21]. Fill Area #2 covers approximately 52,000 square feet and is estimated by GEI to contain 19,000 cubic yards of fill. Fill Area #3 covers approximately 14,500 square feet and is estimated by GEI to contain 2,600 cubic yards of fill [4; 21]. Available file information did not indicate further details regarding the use of these fill areas or years of disposal.

A spill incident occurred at the AWI facility in July 1983 involving a release of oil into the Monatiquot River from a terra cotta drain pipe connected to the floor drain system in the AWI building. The source of the spill was determined by GEI to initiate from an air-compressor unit in the AWI building where oil-contaminated condensate was discharged into floor drains and continued into the terra cotta drain pipe. Jetline Services, Inc. (Jetline) was retained by AWI in November 1983 to recover the oil from the river and excavate the contaminated soil from the area of the terra cotta drain pipe. An oil/water separator was installed by Jetline to recover the oil-contaminated condensate from the air-compressor. A groundwater monitoring well was installed by GEI in this area to monitor

the subsurface conditions [2]. Available file information did not include further details of the remediation or post-remediation sampling.

In 1985, GEI investigated a potential release from an underground storage tank (UST) used to store gasoline along the southern portion of Fill Area #1 [2]. Available file information did not indicate further details on this UST and of this investigation.

In April 1988, Environmental Resource Management, Inc. (ERM) conducted an environmental assessment for regulatory compliance at the AWI facility. Recommendations were made regarding air emissions, wastewater discharge, spill prevention, solid waste and hazardous waste management, historic waste disposal, and subsurface investigations for potential contamination [21]. Available file information did not indicate further details of these recommendations.

In 1988 and 1989, Gale Associates (Gale) conducted a study on the 3.72-acre AWI property located south of Plain Street. Reports by Gale included "Hazardous Waste Evaluation, Plain Street, Braintree, Massachusetts" June 1988; "Hazardous Waste Evaluation - Addendum, Plain Street (Lot 24), Braintree, Massachusetts" March 1990; and Waiver Application dated November 30, 1990. As a result of these investigations, this section of the AWI property was classified as a non-priority disposal site by MADEP [21].

In September 1992, GEI prepared a Limited Phase I Site Investigation (Phase I) and an Interim Measures Status Report for the AWI property. Soil and groundwater samples were collected during the Phase I to characterize the fill areas from the AWI property. Groundwater samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, and total petroleum hydrocarbons (TPHs). Toxic Characteristic Leaching Procedure (TCLP) analyses were performed on soil samples for VOCs, SVOCs, and metals. Soil samples were also analyzed for polychlorinated biphenyls (PCBs), asbestos, TPH, and VOCs by laboratory analysis [21].

During the GEI Phase I, TCLP analyses of the soil samples collected in Fill Area #1 indicated barium and cadmium. The PCB Aroclor 1254, 1,1,1-trichloroethane and toluene were also detected in soil samples collected from Fill Area #1. TCLP analyses of the soil samples collected in Fill Area #2 indicated barium. Asbestos was also detected in a soil sample collected from Fill Area #2. TCLP analyses of the soil samples collected in Fill Area #3 indicated barium, cadmium, and silver [21].

Additionally, during the GEI Phase I, a former drum disposal area in Fill Area #1 was encountered as a result of a magnetometer survey. During December 1990 and January 1991, a drum and contaminated soil excavation program was implemented by GEI as a MADEP-approved Interim Measure. There were 396 crushed drums and 200 cubic yards of contaminated soil/fill removed from an excavation trench in Fill Area #1. The contaminated soil and drums were segregated and stockpiled on the AWI property by Terra Vac, Inc. (Terra Vac). Confirmatory soil samples collected from the sides and bottom of the drum excavation area indicated that TPHs were detected above reporting limits.

Compounds detected in soil samples collected from the stockpiled soil included: acetone, 1,1-dichloroethane, toluene, ethylbenzene, xylene (total), and 1,1,1-trichloroethane; however, no reference samples were collected during this sampling event [2].

The stockpiled contaminated soil was treated by vacuum extraction for the removal of VOCs by Terra Vac [2]. The stockpiled soil was also treated for reduction of petroleum hydrocarbons through means of bioremediation. According to a May 1996 GEI Release Abatement Measure (RAM) Completion Report, the treated stockpiled soil was disposed of at the UWSF/RCI Fitchburg/Westminster Landfill in Westminster, Massachusetts; however, available file information did not indicate when the soil was removed from the AWI property [1].

According to the GEI Phase I report, the 396 crushed drums and residual materials from the drums were transported to the Marine Shale Processing, Inc. incinerator in Louisiana for incineration in 1991 [21].

The Interim Measures by GEI also consisted of the installation of 11 monitoring wells, one soil boring, and four test pits on the AWI property. Analytical results detected VOCs, SVOCs, TPHs, and metals in the soil and groundwater on the AWI property. On the eastern portion of the AWI property, GEI reported that a separate phase product, greater than 0.5 inches thick, was located in a monitoring well. Additionally, a leachate outbreak was noted by GEI at the base of Fill Area #1 near the Monaquot River [1]. Refer to the groundwater migration pathway section of this report for further information and sampling results.

On March 26, 1993, GEI collected groundwater samples from monitoring wells MW-12 to MW-19 in the Fill Area #1 section of the AWI property as part of a Phase I supplemental site investigation [2]. Refer to the groundwater migration pathway section of this report for further information and sampling results.

During the 1993 Phase I supplemental site investigation by GEI, contamination was observed in the area of a former dry well located north of the manufacturing buildings and within Fill Area #2. GEI indicated that run-off from the process of steam cleaning equipment drained into this unlined dry well. Analysis of soil samples collected from a boring (MW-16) in the dry well detected acetone, antimony, arsenic, beryllium, 2-butanone, cadmium, chromium, copper, 1,2-dichloroethene, lead, mercury, nickel, TPH, toluene, and zinc above the sample's reporting limit [2].

The AWI property was listed by MADEP as a Confirmed Disposal Site as a result of the GEI Phase I and Phase I supplemental site investigation conclusions. A Waiver Approvals for the AWI property was submitted to MADEP by GEI and approved on November 11, 1993, with the condition that the feasibility of an Interim Measure to prevent leachate from entering the river be evaluated [1].

GEI initiated a Phase II Comprehensive Site Assessment (Phase II) on the AWI property in April 1994. The findings of the 1994 Phase II were consistent with those of the GEI 1992 Phase I and 1993 Phase I supplemental site investigation. VOCs, SVOCs, TPHs, polynuclear aromatic hydrocarbons (PAHs), and metals were detected in the soil and groundwater. GEI concluded that the presence of PAHs was attributed to the identification of coal ash in Fill Area #2. As part of the Phase II, a Human Health Risk Characterization was performed by Cambridge Environmental, Inc. for the eastern and western portions of the site. The results of the risk characterization concluded that "no significant risk of harm to the environment, public safety or human health exist on the eastern and western portions of the AWI property if an Activity and Use Limitation (AUL) is implemented" [1]. An AUL restricts certain activities and development of the specified areas on the property.

GEI submitted a Leachate Evaluation Study to MADEP on June 14, 1994. The evaluation concluded that a potential may exist for the exceedance of EPA Surface Water Quality Criteria (SWQC) at a time of extreme low flow in the Monaquot River. GEI collected surface water and leachate samples from the Monaquot River in July 1995, which GEI believed to represent the month of low flow conditions. GEI submitted a report to MADEP in August 1995 with the sampling analysis from the low flow conditions. This report concluded that the leachate flow did not cause any exceedances of EPA SWQC under either high or low flow conditions [1].

In November 1995, GEI submitted a RAM plan to MADEP. The scope of the RAM plan was to excavate and "properly" dispose of soil and debris from Fill Area #1 with TPH concentrations greater than 5,000 milligrams per kilogram (mg/kg) and groundwater containing hydrocarbons and residual separate phase petroleum hydrocarbons. The excavation was conducted in the vicinity of MW-3 on the northeastern portion of the AWI property. Excavation activities associated with the RAM were completed on January 24, 1996. GEI indicated in a May 1996 RAM Completion Statement that post removal soil samples collected from the sides and bottom of the excavation indicated that the average TPH concentration in soil at the limits of the RAM excavation were less than 5,000 mg/kg. Therefore, soil from the RAM excavation was used to backfill the disturbed area [1].

On April 11, 1996, and May 16, 1996, groundwater samples were collected by GEI for TPH analysis from four wells in the vicinity of the RAM excavation. The TPH concentrations of groundwater from both sampling events did not exceed the applicable Massachusetts Contingency Plan (MCP) Method 1 GW3 standard for TPH of 50 milligrams per liter (mg/L) [1]. Laboratory results for these groundwater sampling events were not included in available file information.

On June 8, 1996, GEI conducted a property visit to gauge all of the monitoring wells for the presence of separate phase product and to observe the presence of leachate at the base of Fill Area #1. No separate phase product or sheens were observed in any of the monitoring wells on the AWI property. However, leachate was observed at the base of Fill Area #1 [1].

A Supplemental Risk Characterization Report was completed by Cambridge Environmental, Inc. on June 14, 1996. Based on additional post RAM sampling results, Cambridge Environmental, Inc. concluded that, "with the implementation of an AUL, no significant risk to human health, public welfare, or the environment is present at the property" [1].

On July 12, 1996, the AUL was recorded with the Norfolk County Land Court. There were three areas identified by the AUL on the AWI property. Area 1 included Fill Area #1 on the eastern portion of the site. Area 2 included Fill Areas #2 and #3. Area 3 was located along the western portion of the AWI property [1].

On September 27, 1996 GEI issued a Response Action Outcome Statement which indicated that the need and feasibility for further remedial action on the AWI property was "not justified" [1].

On May 11, 1999, TtNUS team personnel, conducted an on-site reconnaissance at the AWI property as part of an EPA SI. Approximately 2,000 square feet of Fill Area #1 is covered by pavement. Some portions of the pavement are cracked in this area. The paved eastern portion of Fill Area #1 is currently used to store pipes from a plumbing distributor. The remaining area of Fill Area #1 was over grown with grass and consist of sand, gravel, and bricks. TtNUS team personnel observed seven monitoring wells which were capped and locked, and one monitoring well which was not capped in Fill Area #1 [11].

On the western side of the Monatiquot River are Fill Areas #2 and #3. Fill Area #2 is completely paved; however, the pavement is cracked and there are several areas where the pavement has been torn up. One monitoring well, which was capped and locked, was observed in Fill Area #2. Fill Area #3 is north of Fill Area #2 and surrounded by a locked chain link fence. Fill Area #3 is over grown with grass. One monitoring well, which was not capped and appeared to be in poor condition, was observed in Fill Area #3 [11].

TtNUS team personnel observed fences along the western and eastern borders of the AWI property and a fence surrounding Fill Area #3. However, there are no other barriers restricting access to the AWI property. Topography of the AWI property is flat. No stressed vegetation, stained soil, or leachate seeps were observed on the AWI property. No visible sheens were observed on Hollingsworth Pond or on the Monatiquot River. No outlet pipes from Hollingsworth Pond or the Monatiquot River were observed. The area on the AWI property south of the AWI building and east of Hollingsworth Pond is paved parking. TtNUS team personnel did not observe any evidence of USTs or ASTs on the AWI property [11].

Southwest of the AWI property, the Monatiquot River drains into Hollingsworth Pond. Hollingsworth Pond, located on the southwestern portion of the AWI property, drains into the Monatiquot River, which flows north through the northern AWI property boundary. There are two dams on the AWI property, one at the northern edge of the pond and

another approximately 450 feet downstream of Hollingsworth Pond on the Monatiquot River. There are several catch basins on the AWI property, which according to the AWI property representative drain into Hollingsworth Pond and the Monatiquot River. The northern, eastern, and western property boundaries are fenced, separating the AWI property from the railroad tracks. Surface water run-off from the parking area on the southern portion of the AWI property drains into Hollingsworth Pond and into catch basins. Surface water on the northern portion of the AWI property drains into the Monatiquot River [11].

On November 3, 1999, TtNUS team personnel collected six surface soil samples from the AWI property and seven sediment samples from the Monatiquot River [11]. Soil, sediment, and quality assurance/quality control (QA/QC) samples were submitted to preselected laboratories for chemical analysis of the following parameters: VOCs, SVOCs, pesticides/PCBs, metals, and cyanide. However, the sediment samples were not analyzed by the laboratory for SVOCs due to an oversight in the paperwork.

As directed by EPA, TtNUS performed a Tier I evaluation of the SI sample analytical results according to Region I EPA - New England Data Validation Functional Guidelines for Evaluating Environmental Analyses (December 1996). A Tier I evaluation consists of checking for data completeness (i.e. that the complete set of analytical results and supporting information for all of the samples have been received by TtNUS from the Contract Laboratory Program (CLP) and/or Delivery of Analytical Services (DAS) laboratories). Under a Tier I data validation, no qualifications are made to the laboratory-reported values to account for field or laboratory QA/QC issues (i.e., holding times, instrument calibrations, blank contamination, matrix spikes, recoveries, etc.). Therefore, detection of chemicals at low concentrations, or at concentrations near the sample quantitation limit, could be considered false positive values due to blank contamination or based on some other criteria identified during a more vigorous Data Validation (i.e. Tier III). In particular, this could be the case for the common laboratory organic compound contaminants: acetone, methylene chloride, 2-butanone, toluene, and phthalates.

Analytical results indicated that 14 pesticides, one PCB, and 16 metals were detected above background concentrations in the sediment samples [40; 41]. Analytical results indicated that one VOC, 11 SVOCs, and five pesticides were detected above background concentrations in surface soil samples [38; 39]. Complete analytical results for sediment and surface soil samples including quantitation and detection limits are presented in Attachment A. Geographic coordinates of the sample locations and other features are presented in Attachment B. Refer to the surface water migration pathway and soil exposure pathway sections for additional information and analytical results.

In addition to the AWI property, there are two properties governed by the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) in Braintree. The AWI property was placed on CERCLIS in 1991. The two other CERCLIS properties are JG Grant and Sons, Inc. (MAD071707301) and Townsend/Textron (MAD985272616) [6]. There are 83 facilities governed by the Resource Conservation and Recovery Information System (RCRIS) in Braintree [7].

Table 1 summarizes structures or areas on the AWI property that are documented or potential sources of contamination, the containment factors associated with each source, and the relative location of each source.

Table 1

Source Evaluation for Armstrong World Industries (former)

| Source Area | Containment Factors | Spatial Location |
|---|--------------------------------|--|
| Fill Area #1 | No containment | Approximately 73,000 square feet located east of the Monatiquot River. |
| Fill Area #2 | No containment | Approximately 52,000 square feet located west of the Monatiquot River. |
| Fill Area #3 | No containment | Approximately 14,500 square feet located north of Fill Area #2. |
| Former Dry Well | No containment | An assumed area of 1 square foot with a depth of 7 feet located north of the manufacturing building within Fill Area #2. |
| Former Lagoon | No containment | Approximately 100 feet by 30 feet located southeast of Fill Area #1. |
| Former Drum Disposal Area | No containment | 396 drums formerly located in Fill Area #1. |
| Air Compressor Spill | No containment | Release of oil into Monatiquot River in 1983. |
| Gasoline Underground Storage Tank (UST) | No known secondary containment | The capacity of the UST is unknown. It was formerly located along the southern portion of Fill Area #1. |
| Stockpiled Soil | No containment | Approximately 200 cubic yards of contaminated soil excavated from the former drum disposal area in Fill Area #1. |
| Chlorine and Ammonia Tanks | No known secondary containment | Available file information do not indicate capacity or location of the former tanks. |

Note: The gasoline UST, stockpiled soil, and chlorine and ammonia tanks have been removed from the AWI property.

[1-4; 11; 21; 43]

Table 2 summarizes the types of potentially hazardous substances which have been disposed, used, or stored on the AWI property.

Table 2

Hazardous Waste Quantity for Armstrong World Industries (former)

| Source Area | Substance(s) | Quantity or Volume/Area | Years of Use/Storage | Years of Disposal |
|-----------------|---|----------------------------|----------------------|-------------------|
| Fill Area #1 | acetone, Aroclor-1254, barium, cadmium, 1,1-dichloroethane, ethylbenzene, 1,1,1-trichloroethane, toluene, and xylene. | 73,000 square feet | 1946 to 1983 | 1946 to 1983 |
| Fill Area #2 | acenaphthene, anthracene, asbestos, barium, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, beta-BHC, bis(2-ethylhexyl)phthalate, gamma-chlordane, chrysene, endrin ketone, fluoranthene, fluorene, heptachlor, heptachlor epoxide, phenanthrene, and pyrene. | 52,000 square feet | unknown | unknown |
| Fill Area #3 | barium, cadmium, and silver. | 14,500 square feet | unknown | unknown |
| Former Dry Well | acetone, antimony, arsenic, beryllium, 2-butanone, cadmium, chromium, copper, 1,2-dichloroethene, lead, mercury, nickel, toluene, and zinc. | 1 foot by 1 foot by 7 feet | unknown | unknown |
| Former Lagoon | ammonia and chlorine | 100 feet by 30 feet | 1972 to 1983 | 1972 to 1983 |

Only source areas which contain CERCLA eligible pollutants or contaminants have been listed.

[1-4; 11; 21; 38-40]

4.0 WASTE/SOURCE SAMPLING

Waste/source sampling completed by previous investigators are included in the operational and regulatory history and waste characteristics section of this report.

On November 3, 1999, TtNUS team personnel collected surface soil samples SS-05 from Fill Area #2. Analytical results from SS-05 detected acenaphthene, anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, beta-BHC, bis(2-ethylhexyl)phthalate, gamma-chlordane, chrysene, endrin ketone, fluoranthene, fluorene, heptachlor, heptachlor epoxide, phenanthrene, and pyrene [11; 38; 39]. Refer to the soil exposure pathway section for further details and analytical results regarding the TtNUS surface soil samples collected.

5.0 GROUNDWATER MIGRATION PATHWAY

Soils in the vicinity of AWI consist of stratified drift composed of glaciofluvial deposits of sand, gravel, and boulders. Glacial outwash deposits extend from the western bank of the Monatiquot River at AWI to 1 mile north of the AWI property. Glacial kame deposits are located east of the Monatiquot River at AWI. Swamp deposits consisting of organic material mixed in with varying amounts of silt, clay, sand, and gravel are found along the Monatiquot River and south of AWI. Regionally, till deposits surround the AWI property and are located in areas topographically higher in elevations than the AWI property [21].

Based on groundwater elevation measurements from monitoring wells on the AWI property, GEI concluded that groundwater flow from Fill Area #1 is northwest towards the downstream side of the lower dam that crosses the Monatiquot River. Groundwater flow from Fill Area #2 and Fill Area #3 is northeast towards the Monatiquot River. Fill Areas #1, #2, and #3 are located within an area of stratified drift. Groundwater on the southern portion of the AWI property flows west toward Hollingsworth Pond [21].

Bedrock underlies the stratified drift at the AWI property. There are also bedrock outcrops of Proterozoic age in several locations on the AWI property. This bedrock is identified as a medium to coarse grained, pinkish to gray, granodiorite [35]. The depth to bedrock beneath the ground surface ranged from 8.3 feet in Fill Area #3 to 40 feet in the former lagoon area [21]. No bedrock formations mapped within 4-radial miles of the AWI property exhibit karst characteristics.

According to the GEI Phase I report, groundwater was present in fill and natural soils above the bedrock surface in Fill Areas #1 and #2. However, in Fill Area #3, groundwater was present only within the bedrock and not the overlying fill and soils. Groundwater was detected from approximately 11.06 feet to 18 feet below the ground surface in the vicinity of Fill Area #1. Groundwater was detected from approximately 7.01 feet to 12.59 feet below the ground surface in Fill Areas #2 and #3 [21]. According to available file information, the depth to groundwater has not been evaluated for the remaining areas of the AWI property.

The average annual precipitation from 1961-1990 at the AWI property as measured in Blue Hill, approximately 2.5 miles northeast, is 50.3 inches [26].

All or part of the following cities and towns in MA are located within 4-radial miles of the AWI property: Milton, Quincy, Randolph, Holbrook, Weymouth, and Braintree [16; 17; 27; 28].

Milton obtains their drinking water supply from the Massachusetts Water Resources Authority (MWRA) supply which is drawn from the Quabbin Reservoir [10]. There is also a small community supply which includes two groundwater well sources; however, these wells are not located within 4-radial miles of the AWI property [10; 16; 17].

The Town of Braintree receives their water supply from two surface water sources, Great Pond and Richardi Reservoir, which are not along the 15-mile downstream surface water pathway from the AWI property. Great Pond and Richardi Reservoir serve 100 percent of the Town of Braintree, and have an MWRA emergency back up system [5].

Randolph and Holbrook obtain their drinking water from Braintree's Great Pond surface water supply and use the MWRA as an emergency drinking water supply [12; 14]. The Town of Quincy obtains their drinking water supply from the MWRA. There are no public groundwater wells in Quincy [9; 13].

Weymouth obtains their drinking water supply from Braintree's Great Pond surface water supply and a blended system of four groundwater supply wells which are all in a Zone 1 or Zone 2 well head protection area. Great Pond and the groundwater supply wells serve approximately 55,000 people. The Great Pond system serves approximately 80 percent of the population, and 20 percent of the population is served by the four supply wells. The four active groundwater wells in Weymouth located within 4-radial miles are the Circuit Avenue Well, Winter Street Well #2, Main Street Well, and Libbey Park Well. Since one source contributes more than 40 percent of the supply, the sources are apportioned by their percent contribution; therefore, it is assumed that each of the wells supplies 2,750 people with drinking water [8]. There is a community well, called the Water Store Well, located approximately 3.2 miles west of the AWI property on Washington Street, which serves approximately 25 people during the summer months [9].

Table 3 summarizes the public groundwater supply sources within 4-radial miles of the AWI property.

Table 3

**Public Groundwater Supply Sources Within 4-Radial Miles
of Armstrong World Industries (former)**

| Distance (miles)/ Direction from Site | Source Name | Location of Source ^a | Estimated Population Served | Source Type ^b |
|--|------------------|------------------------------------|-----------------------------------|-----------------------------|
| 2.75/northeast | Winter St. #2 | Weymouth | 2,750 | Overburden |
| 2.75/northeast | Circuit Ave. | Weymouth | 2,750 | Overburden |
| 2.75/northeast | Main St. | Weymouth | 2,750 | Overburden |
| 3.1/east | Libbey Park | Weymouth | 2,750 | Overburden |
| 3.2/west | Water Store Well | Weymouth | 25 | Overburden |

^a Indicates Town in which well is located.

^b Overburden, Bedrock, or Unknown.

[5; 8-14; 16-18]

Private groundwater supplies within 4-radial miles of the AWI property were estimated using equal distribution calculations of U.S. Census CENTRACTS data identifying population, households, and private drinking water wells for "Block Groups" that lie within individual radial distance rings of the AWI property. The estimated number of residents utilizing private drinking water sources within 4-radial miles of the AWI property is 267 persons [19]. The exact location of the nearest private well is unknown; however, based on information from the Braintree Board of Health, the nearest private well is assumed to be located greater than 0.5 miles from the AWI property. The Braintree Board of Health informed TtNUS team personnel that all private wells in Braintree are used for irrigation only [20]. Therefore, the estimated population on private wells between 0.0 and 0.5-radial miles has been moved to the 0.5 to 1-radial mile ring.

Table 4 summarizes the estimated drinking water populations served by groundwater sources within 4-radial miles of AWI.

Table 4

**Estimated Drinking Water Populations Served by Groundwater Sources
Within 4-Radial Miles of Armstrong World Industries (former)**

| Radial Distance from Armstrong World Industries (miles) | Estimated Population Served by Private Wells | Estimated Population Served by Public Wells | Total Estimated Population Served by Groundwater Sources Within the Ring |
|---|--|---|---|
| ≥ 0.00 to 0.25 | 0 | 0 | 0 |
| > 0.25 to 0.50 | 0 | 0 | 0 |
| > 0.50 to 1.00 | 12 | 0 | 12 |
| > 1.00 to 2.00 | 90 | 0 | 90 |
| > 2.00 to 3.00 | 65 | 8,250 | 8,315 |
| > 3.00 to 4.00 | 100 | 2,775 | 2,875 |
| TOTAL | 267 | 11,025 | 11,292 |

[5; 8-19]

In 1990 and 1991, as part of the Interim Measures by GEI, groundwater samples were collected from monitoring wells MW-01 to MW-11 on the AWI property. The samples were analyzed for metals, TPH, VOCs, and SVOCs. The analytical results indicated that TPH, six metals, 10 VOCs, and 12 SVOCs were detected at concentrations greater than the detection limits for these compounds. These contaminants were encountered in Fill Area #1 and in the former lagoon area [21]. Detection limits for compounds were not included in available file information. Therefore this sampling event will not be evaluated for the purposes of this report.

On March 26, 1993, GEI collected groundwater samples from monitoring wells MW-12 to MW-19 at the AWI property. The samples were analyzed for metals, VOCs, and SVOCs. The analytical results indicated that five metals, four SVOCs, and seven VOCs were detected in groundwater. For comparison purposes only, TtNUS team personnel selected MW-19 as a background groundwater well for this sampling round. Although the exact location of MW-19 is unknown, the highest groundwater elevation was measured in this well. For the purposes of this evaluation, detected refers to a compound that was greater than or equal to three times the reference sample's concentration or greater than or equal to one time the reference sample's sample reporting limit if the compound was not found in the reference sample. In addition to the contamination previously encountered in Fill Area #1 and in the former lagoon area, this sampling event revealed contamination in the

area of the former dry well located north of the AWI building within Fill Area #2. Monitoring well MW-16 was installed in the former dry well [2].

Table 5 summarizes the highest concentrations of substances detected in groundwater samples collected by GEI on March 26, 1993, at the AWI property.

Table 5

Summary of Analytical Results of Groundwater Samples Collected by GEI on March 26, 1993 at Armstrong World Industries (former)

| Sample Location | Compound/Element | Sample Concentration | Reference Concentration | Comments |
|-----------------|------------------------------|----------------------|-------------------------|------------|
| MW-16 | INORGANICS | | | |
| | Iron | 17.5 ppm | 0.1 U ppm | 175 × SRL |
| | Nickel | 0.056 ppm | 0.04 U ppm | 1.4 × SRL |
| | SVOCs | | | |
| | Butylbenzylphthalate | 13 ppb | 10 U ppb | 1.3 × SRL |
| | 4-Methylphenol | 79 ppb | 10 U ppb | 7.9 × SRL |
| | VOCs | | | |
| | Toluene | 470 ppb | 5 U ppb | 94 × SRL |
| | Chloromethane | 400 ppb | 10 U ppb | 40 × SRL |
| | 1,1-Dichloroethene | 75 ppb | 5 U ppb | 15 × SRL |
| | 1,1-Dichloroethane | 140 ppb | 5 U ppb | 28 × SRL |
| MW-15 | INORGANICS | | | |
| | Manganese | 10.3 ppm | 0.95 ppm | 10.8 × REF |
| MW-13 | INORGANICS | | | |
| | Zinc | 0.19 ppb | 0.061 ppb | 3.1 × REF |
| | SVOCs | | | |
| MW-12 | Bis (2-ethylhexyl) phthalate | 120 ppb | 10 U ppb | 12 × SRL |
| | INORGANICS | | | |
| | Lead | 0.0066 ppm | 0.005 U ppm | 1.32 × SRL |

| | | | | | |
|-------|--------------|-----|-----|----------|------------|
| MW-18 | SVOCs | | | | |
| | Phenol | 110 | ppb | 10 U ppb | 11 × SRL |
| | VOCs | | | | |
| | Acetone | 33 | ppb | 10 U ppb | 3.3 × SRL |
| | Benzene | 7.4 | ppb | 5 U ppb | 1.48 × SRL |
| MW-17 | VOCs | | | | |
| | 2-Butanone | 110 | ppb | 10 U ppb | 11 × SRL |

SRL = Sample reporting limit.

U = The substance was analyzed for and was not detected.

REF = Reference.

ppb = Parts per billion

ppm = Parts per million

VOCs = Volatile organic compounds

SVOCs = Semivolatile organic compounds

[2]

Phase II groundwater samples collected by GEI indicated the presence of VOCs, SVOCs, and metals [1]. Laboratory analytical results for this sampling event were not included in available file information.

Based on analytical results from previous monitoring well sampling events at the AWI property, groundwater beneath the AWI property has been impacted by a release of hazardous substances attributable to on-site sources. Based on available file information, no actions have been taken to address the groundwater contamination. There are no known public or private drinking water supply wells within 0.5 miles of the AWI property and no nearby drinking water sources are known or suspected to have been impacted by the release from on-site sources.

6.0 SURFACE WATER MIGRATION PATHWAY

The AWI property is located within the Weymouth Fall River drainage basin, which is drained by the Monatiquot River [21]. The Monatiquot River also flows between Fill Areas #1, #2, and #3 on the northern portion of the AWI property. Based on the topography of Fill Area #1, #2, and #3, surface water run-off from these areas is expected to flow approximately 15 ft down the river bank into the Monatiquot River. The probable point of entry (PPE) for the surface water pathway is located approximately 10 feet north of the AWI building in the Monatiquot River. Surface water run-off from the parking area on the southern portion of the AWI property drains into Hollingsworth Pond and into catch basins which drain into Hollingsworth Pond [11].

The Monatiquot River flows northeasterly for approximately 3.6 miles into the Weymouth Fore River. Based on National Wetlands Inventory maps, the Weymouth Fore River is characterized as a coastal tidal water body. The Weymouth Fore River flows northeasterly for approximately 4.4 miles and opens up into a shallow ocean zone which includes Hingham Bay, Hull Bay, Quincy Bay, and a portion of the Boston Harbor. The shallow ocean zone extends 7 miles in an arc from the middle of Nantasket Beach at Hull, MA to Chapel Rocks at Squantum, MA. This 7-mile arc also indicates the terminus of the 15-mile downstream surface water pathway. There is a portion of the Boston Harbor, within the 7-mile arc, between Lovell Island and Deer Island which is described as a moderate ocean zone [29-33].

Using the US Geological Survey (USGS) estimating flow factor of 1.8 cubic feet per second (cfs) per square mile and USGS 1:25,000-scale topographic maps, the flow rate of the Monatiquot River, with a drainage area of 15.1 square miles, is estimated to be 27.2 cfs (Figure 3) [16; 17; 22; 27; 28].

There are no surface water drinking water intakes along the 15-mile downstream pathway from the AWI property. Table 6 summarizes surface water bodies along the 15-mile downstream pathway.

Table 6

**Surface Water Bodies Along the 15-Mile Downstream Pathway
from Armstrong World Industries (former)**

| Surface Water Body | Descriptor ^a | Length of Reach (miles) | Flow Characteristics (cfs) ^b | Length of Wetland Frontage (miles) |
|---------------------|--------------------------|-------------------------|---|------------------------------------|
| Monatiquot River | Small to Moderate Stream | 3.6 | 27.2 | 0.6 |
| Weymouth Fore River | Coastal Tidal Waters | 4.4 | NA | 10 |
| Hingham Bay * | Shallow Ocean Zone | 7.0 | NA | 44.1 |
| Boston Harbor | Moderate Ocean Zone | NA | NA | 0 |

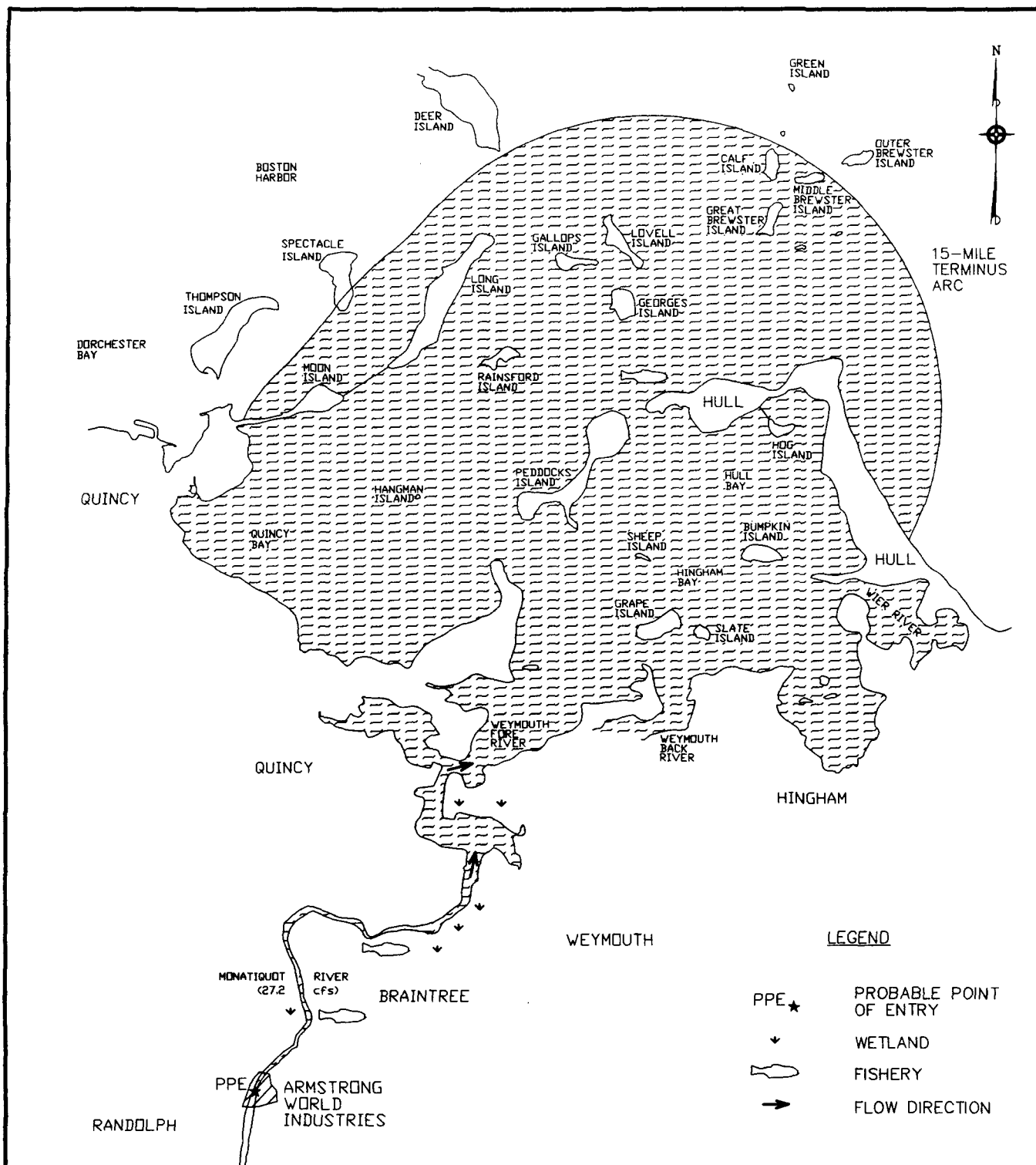
^a Small to moderate stream 10 to 100 cfs. Coastal tidal waters (flow not applicable). Shallow ocean zone or Great Lake (flow not applicable). Moderate depth ocean zone or Great Lake (flow not applicable).

^b Cubic feet per second.


NA = Not Applicable.

* The Hingham Bay shallow ocean zone also includes Quincy Bay, Hull Bay, and a portion of the Boston Harbor.

[22; 23; 27-33]



SOURCE: 1:100000-SCALE METRIC TOPOGRAPHIC MAP, BOSTON, MA-RI-CT, 1989; PROVINCETOWN, MA, 1984

| | | | | |
|-------------------------------------|-----------------|------------|--|--|
| SURFACE WATER PATHWAY | | | FIGURE 3 | |
| ARMSTRONG WORLD INDUSTRIES (FORMER) | | |  TETRA TECH NUS, INC. | |
| BRAINTREE, MASSACHUSETTS | | | | |
| DRAWN BY: | D.W. MACDOUGALL | REV.: | 0 | 55 Jonspin Road Wilmington, MA 01887 (978)658-7899 |
| CHECKED BY: | C. MOORE | DATE: | MARCH 9, 2000 | |
| SCALE: | NOT TO SCALE | ACAD NAME: | DWG\SI\0800\FIG_3.DWG | |

The Monaquot River is designated as a Class B waterway by MADEP Division of Water Pollution Control. A Class B waterway is defined by MADEP as waters designated as a habitat for fish, other aquatic life, and wildlife, and for primary and secondary contact recreation [24].

Hull Bay, Boston Harbor, and the Weymouth Fore River are designated as Class SB waterways by MADEP Division of Water Pollution Control. A Class SB waterway is defined by MADEP as waters designated as a habitat for fish, other aquatic life and wildlife for primary and secondary contact recreation. In approved areas, they shall be suitable for shellfish harvesting with depuration [24].

Quincy Bay and Hingham Bay are designated as Class SA waterways by MADEP Division of Water Pollution Control. A Class SA waterway is defined by MADEP as waters designated as an excellent habitat for fish, other aquatic life and wildlife for primary and secondary contact recreation. In approved areas, they shall be suitable for shellfish harvesting without depuration [24]. There are approximately 54.7 miles of wetland frontage along the 15-mile downstream pathway from the AWI property [23].

Table 7 summarizes the sensitive environments located along the 15-mile downstream pathway from the AWI property.

Table 7

**Sensitive Environments Along the 15-Mile Downstream Pathway from
Armstrong World Industries (former)**

| Sensitive Environment Name | Sensitive Environment Type | Surface Water Body | Downstream Distance from PPE (miles) | Flow Rate at Environment (cfs) ^a |
|----------------------------|----------------------------|---------------------|--------------------------------------|---|
| Monatiquot River | Clean Water Act | Monatiquot River | 0 | 27.2 |
| Monatiquot River | Wetlands (0.6 miles) | Monatiquot River | 0.24 | 27.2 |
| Weymouth Fore River | Wetlands (10 miles) | Weymouth Fore River | 3.61 | NA |
| Hingham Bay* | Wetlands (44.1 miles) | Hingham Bay | 8.41 | NA |
| Weymouth Fore River | State Threatened Animal | Weymouth Fore River | 6.54 | NA |
| Weymouth Fore River | State Threatened Plant | Weymouth Fore River | 6.7 | NA |
| Weymouth Fore River | State Threatened Plant | Weymouth Fore River | 7.15 | NA |
| Hingham Bay* | Federal Endangered Animal | Hingham Bay | 8.24 | NA |
| Hingham Bay* | State Threatened Plant | Hingham Bay | 8.39 | NA |
| Hingham Bay* | Federal Endangered Animal | Hingham Bay | 9.78 | NA |

^a Cubic feet per second

PPE = Probable Point of Entry

* The Hingham Bay shallow ocean zone also includes Quincy Bay, Hull Bay, and a portion of the Boston Harbor.

[23; 25; 29-33]

In May 1990, GEI collected three surface water samples from the Monatiquot River and analyzed them for metals, TPHs, and VOCs. Metals and VOCs were not detected above reference criteria in the surface water samples [21]. Available file information did not include laboratory analysis results for this sampling event.

In order to evaluate the potential impact of leachate on the Monatiquot River under low flow conditions, GEI collected surface water and leachate samples during July 1995. Based on the analysis conducted, potential leachate flow into the Monatiquot River did not cause any exceedances of EPA SWQC under either high flow or low flow conditions [1]. The surface water sample laboratory analysis results were not included in available file information.

On November 3, 1999, TtNUS team personnel collected seven sediment samples from the Monatiquot River as part of the AWI property SI. The sediment samples were analyzed for VOCs, pesticides/PCBs, total metals, and cyanide through a DAS laboratory [40; 41]. Table 8 summarizes the sediment samples collected by TtNUS team personnel on November 3, 1999.

Table 8

**Sample Summary: Armstrong World Industries (former)
Sediment Samples Collected by TtNUS Team Personnel on November 3, 1999**

| Sample Location No. | Traffic Report No. | Time (hrs) | Remarks | Sample Depth (feet) | GPS Data (Latitude and Longitude) | Sample Information |
|-------------------------|--------------------|------------|---------|---------------------|-----------------------------------|---|
| Matrix: Sediment | | | | | | |
| 08-SD-01 | D01284 | 1225 | Grab | 0 to 6 | 42°11'45.0" N 71°00'15.8" W | Reference sediment sample collected in the Monatiquot River approximately 20 feet south of Plain Street. Sample appeared to be dark brown sandy silt with some gravel and organic material. PID reading = 0 ppm. |
| 08-SD-02 | D01290 | 1230 | Grab | 0 to 6 | 42°11'44.8" N 71°00'15.6" W | Reference sediment sample collected in the Monatiquot River approximately 40 feet south of Plain Street. Sample appeared to be dark brown sandy silt with some organic material. PID reading = 0 ppm. Collected for metals analysis only. |

| | | | | | | |
|----------------------|--------|------|------|--------|--------------------------------|--|
| 08-SD-03 (MS/MSD) | D01285 | 1055 | Grab | 0 to 6 | 42°11'56.5" N 71°00'11.0" W | Sediment sample collected in the Monatiquot River approximately 100 feet downstream of the PPE. Sample appeared to be brown sandy silt. PID reading = 0 ppm. |
| 08-SD-DUP-01 | D01286 | 1115 | Grab | 0 to 6 | 42°11'56.5" N 71°00'11.1" W | Duplicate of SD-03, collected for quality control. |
| 08-SD-04 | D01287 | 1035 | Grab | 0 to 6 | 42°11'58.7" N 71°00'09.5" W | Sediment sample collected approximately 5 feet upstream from the bridge/dam (lower). Sample appeared to be brown gravely sand with trace silt and organic material. PID reading = 0 ppm. |
| 08-SD-05 | D01288 | 0935 | Grab | 0 to 6 | 42°12'11.3" N 70°59'50.1" W | Sediment sample collected in the Monatiquot River approximately 0.25 miles downstream from the site boundary, in wetlands area. Sample appeared to be brown silty sand with some gravel and organic material. PID reading = 0 ppm. |
| 08-SD-06 | D01289 | 1145 | Grab | 0 to 6 | 42°11'55.0" N 71°00'12.3" W | Sediment sample collected in the Monatiquot River approximately 40 feet downstream from the PPE. Sample appeared to be dark brown silty sand with some organic material. PID reading = 0 ppm. |

GPS = Global positioning system.
 MS/MSD = Matrix spike/matrix spike duplicate.
 PID = Photoionization detector.
 PPE = Probable point of entry.
 ppm = Parts per million.

[11; 42]

For each sample location, a compound or element is listed if it is detected at three times or greater than the reference sample concentration (SD-01 or SD-02). However, if the compound or element is not detected in the reference sample, the reference sample's sample quantitation limit (SQL) or sample detection limit (SDL) is used as the reference value. These compounds or elements are listed if they occurred at a value equal to or greater than the reference sample's SQL or SDL and are designated by their approximate relative concentration above these values. Table 9 is a summary of the contaminants detected in sediment samples collected by TtNUS team personnel on November 3, 1999.

Table 9

Summary of Analytical Results
Sediment Sample Analysis for Armstrong World Industries (former)
Samples Collected by TtNUS Team Personnel on November 3, 1999

| Sample Location | Compound/ Element | Sample Concentration | | | Reference Concentration | | | Comments |
|------------------------------|----------------------|----------------------|----|-----|-------------------------|----|-----|------------|
| 08-SD-03 (D01285) | PESTICIDES | | | | | | | |
| | delta-BHC | 8.3 | P | ppb | 1.6 | U | ppb | 5.2 × SQL |
| | gamma-BHC | 3.9 | | ppb | 1.6 | U | ppb | 2.4 × SQL |
| 08-SD-DUP-01 (D01286) | PESTICIDES | | | | | | | |
| | gamma-BHC | 23 | P | ppb | 1.6 | U | ppb | 14.4 × SQL |
| | gamma-Chlordane | 2.3 | P | ppb | 1.6 | U | ppb | 1.4 × SQL |
| | 4,4'-DDD | 32 | P* | ppb | 8.9 | | ppb | 3.6 × REF |
| | 4,4'-DDE | 5.7 | P | ppb | 3.1 | U | ppb | 1.8 × SQL |
| | Dieldrin | 18 | P | ppb | 3.1 | U | ppb | 5.8 × SQL |
| | Endosulfan II | 16 | P | ppb | 3.1 | U | ppb | 5.2 × SQL |
| | Endosulfan sulfate | 37 | P | ppb | 3.1 | U | ppb | 11.9 × SQL |
| | Heptachlor epoxide | 1.6 | P | ppb | 1.6 | U | ppb | 1 × SQL |
| | INORGANICS | | | | | | | |
| | Cadmium | 8.5 | | ppm | 0.017 | U | ppm | 500 × SDL |
| | Zinc | 774 | N* | ppm | 119 | N* | ppm | 6.5 × REF |
| 08-SD-04 (D01287) | PESTICIDES | | | | | | | |
| | delta-BHC | 3.2 | P | ppb | 1.6 | U | ppb | 2 × SQL |
| | INORGANICS | | | | | | | |
| | Manganese | 1,310 | * | ppm | 281 | * | ppm | 4.7 × REF |
| 08-SD-05 (D01288) | PESTICIDES/PCBs | | | | | | | |
| | Aroclor-1254 | 250 | P | ppb | 31 | U | ppb | 8.1 × SQL |
| | gamma-Chlordane | 3.3 | | ppb | 1.6 | U | ppb | 2.1 × SQL |
| | Dieldrin | 4.9 | P | ppb | 3.1 | U | ppb | 1.6 × SQL |

| | | | | | | |
|----------------------|------------------------|--------|-----|-----|--------|--------------------|
| 08-SD-06 (D01289) | PESTICIDES/PCBs | | | | | |
| | Aldrin | 4.2 | P | ppb | 1.6 | U ppb 2.6 × SQL |
| | Aroclor-1254 | 190 | P | ppb | 31 | U ppb 6.1 × SQL |
| | gamma-Chlordane | 3.2 | P | ppb | 1.6 | U ppb 2 × SQL |
| | 4,4'-DDD | 28 | P | ppb | 8.9 | ppb 3.1 × REF |
| | 4,4'-DDT | 6.0 | | ppb | 3.1 | U ppb 1.9 × SQL |
| | Endosulfan II | 17 | P | ppb | 3.1 | U ppb 5.5 × SQL |
| | Endosulfan sulfate | 17 | P | ppb | 3.1 | U ppb 5.5 × SQL |
| | Endrin | 20 | P | ppb | 3.1 | U ppb 6.5 × SQL |
| | Endrin ketone | 14 | P | ppb | 3.1 | U ppb 4.5 × SQL |
| | Methoxychlor | 39 | P | ppb | 16 | U ppb 2.4 × SQL |
| | INORGANICS | | | | | |
| | Antimony | 2.6 | NB | ppm | 0.34 | UN ppm 7.6 × SDL |
| | Arsenic | 9.9 | | ppm | 2.7 | ppm 3.7 × REF |
| | Barium | 111 | | ppm | 35.3 | ppm 3.1 × REF |
| | Cadmium | 2.3 | | ppm | 0.017 | U ppm 135 × SDL |
| | Chromium | 61.8 | | ppm | 19 | ppm 3.3 × REF |
| | Copper | 1,160 | N | ppm | 28.1 | N ppm 41.3 × REF |
| | Iron | 36,500 | | ppm | 11,800 | ppm 3.1 × REF |
| | Lead | 669 | N*E | ppm | 65.3 | N*E ppm 10.2 × REF |
| | Mercury | 1.4 | | ppm | 0.054 | B ppm 25.9 × REF |
| | Nickel | 58.3 | E | ppm | 13.1 | E ppm 4.5 × REF |
| | Selenium | 5.7 | N | ppm | 0.98 | N ppm 5.8 × REF |
| | Sodium | 272 | B | ppm | 22.6 | U ppm 12 × SDL |
| | Thallium | 0.68 | B | ppm | 0.67 | U ppm 1 × SDL |
| | Vanadium | 122 | * | ppm | 16.2 | * ppm 7.5 × REF |
| | Zinc | 743 | N* | ppm | 119 | N* ppm 6.2 × REF |

PCBs = Polychlorinated biphenyls.

U = Compound was analyzed for but not detected.

| | |
|-----|--|
| B | = Below contract required detection limit. |
| P | = Greater than 25 percent deviation between columns. |
| * | = Result from dilution analysis. |
| E | = Concentration greater than calibration range. |
| N | = Spike percent recovery greater than limit. |
| SQL | = Sample quantitation limit. |
| SDL | = Sample detection limit. |
| REF | = Reference sample concentration. |
| ppb | = Parts per billion. |
| ppm | = Parts per million. |

[40; 41]

Analytical results of the sediment samples indicated that 14 pesticides, one PCB, and 16 metals were detected. Concentrations ranged from 1 times the SQL (heptachlor epoxide in SD-DUP-01) to 500 times the SDL (cadmium in SD-DUP-01). No VOCs were detected in the sediment samples. The PCB, Aroclor-1254, was detected in sediment samples SD-05 and SD-06 [40; 41].

TtNUS team personnel collected sediment samples from the Monatiquot River on November 3, 1999 as part of the AWI property SI. Of the substances indicated in the table above, only gamma-chlordane, endrin ketone, and heptachlor epoxide were detected on the AWI property through chemical analysis of surface soil samples [38]. The most probable source of PCBs on the AWI property is Fill Area #1 where the PCB, Aroclor-1254, was detected in a soil sample collected by GEI in 1992. TCLP analysis of soil samples collected from Fill Area #1, #2, and #3 by GEI in 1992 indicated barium [21]. The metals antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc were detected in soil samples collected from the former dry well by GEI in 1993 [2]. These metals were also detected in sediment samples collected by TtNUS [41]. Based on analytical data from the TtNUS sampling event, a release of hazardous substances to the surface water pathway from the AWI property has been documented. As a result of the release, a Clean Water Act protected water body, a fishery, and 0.1 miles of wetland frontage have been impacted. No other sensitive environments are known or suspected to have been impacted.

7.0 SOIL EXPOSURE PATHWAY

The AWI property is currently managed by Petrini and Sons, Inc. The AWI building on the western portion of the AWI property is vacant. The building on the eastern portion of the AWI property is utilized as warehouse space and has four tenants. There are approximately 60 full-time employees at the AWI property [34]. The area surrounding the AWI property is mixed residential and commercial properties [11]. There are no schools or day-care facilities within 200 feet of an area of observed contamination [11; 16; 17]. The nearest school is approximately 0.4 miles west of the AWI property [16; 17]. The nearest residence to the AWI property borders the paved parking area along Plain Street on the southern portion of the AWI property [11]. The estimated population within 1-radial mile of the AWI property is 6,952 people [19]. There are no known terrestrial sensitive

environments within areas of observed contamination on the AWI property [11].

In December 1990 and January 1991, there were approximately 200 cubic yards of contaminated soil removed from the area of the former drum disposal excavation as an Interim Measure approved by MADEP. Compounds detected in soil samples collected from the stockpiled soil included acetone, 1,1-dichloroethane, toluene, ethylbenzene, xylene (total), and 1,1,1-trichloroethane. The stockpiled soil was excavated from within Fill Area #1 and disposed of at the UWSF/RCI Fitchburg/Westminster, Massachusetts [21].

On November 3, 1999, TtNUS team personnel collected six surface soil samples from the AWI property as part of the AWI property SI. The surface soil samples were analyzed for VOCs through a DAS laboratory and SVOCs, pesticides/PCBs, total metals, and cyanide through CLP laboratories [38-40]. Table 10 summarizes the surface soil samples collected by TtNUS team personnel on November 3, 1999.

Table 10

Sample Summary: Armstrong World Industries (former)
Surface Soil Samples Collected by TtNUS Team Personnel on November 3, 1999

| Sample Location No. | Traffic Report No. | Time (hrs) | Remarks | Sample Depth (feet) | GPS Data (Latitude and Longitude) | Sample Information |
|----------------------|---------------------------|------------|---------|---------------------|-----------------------------------|--|
| Matrix: Soil | | | | | | |
| 08-SS-01 | APL19 MALF35 D01279 | 1530 | Grab | 0 to 24 | 42°11'49.3" N 71°00'02.4" W | Soil sample collected in an undisturbed area approximately 90 feet west of John W. Mahar Highway as a reference sample. Sample appeared to be brown fine grain sand with some organic material. PID reading = 0 ppm. |
| 08-SS-02 | MALF36 | 1535 | Grab | 0 to 24 | 42°11'49.3" N 71°00'02.1" W | Soil sample collected in an undisturbed area, approximately 20 feet east of 08-SS-01 as a reference sample (metals only). Sample appeared to be brown fine grain sand with some gravel. PID reading = 0 ppm. |
| 08-SS-03 (MS/MSD) | APL20 MALF37 D01280 | 1505 | Grab | 0 to 24 | 42°11'56.9" N 71°00'09.2" W | Soil sample collected approximately 15 feet east of the Monaquot River in the southwestern portion of Fill Area #1. Sample appeared to be brown sand with some silt. PID reading = 0 ppm. |
| 08-SS-04 | APL21 MALF38 D01281 | 1355 | Grab | 0 to 24 | 42°11'58.5" N 71°00'08.5" W | Soil sample collected approximately 15 feet east of the bridge/dam (lower) in the Monaquot River, in the northwestern portion of Fill Area #1. Sample appeared to be light brown sand with some silt. PID reading = 0 ppm. |
| 08-SS-DUP-01 | APL22 MALF39 D01282 | 1405 | Grab | 0 to 24 | 42°11'58.5" N 71°00'08.5" W | Duplicate of SS-04, collected for quality control. |

| | | | | | | |
|----------|---------------------------|------|------|---------|--------------------------------|--|
| 08-SS-05 | APL23 MALF40 D01283 | 1340 | Grab | 0 to 24 | 42°11'59.6" N 71°00'09.5" W | Soil sample collected approximately 15 feet west of the Monatiquot River in the northeast portion of Fill Area #2. Sample appeared to be brown sand with some silt. PID reading = 0 ppm. |
|----------|---------------------------|------|------|---------|--------------------------------|--|

GPS = Global positioning system.
 MS/MSD = Matrix Spike/Matrix Spike Duplicate.
 PID = Photoionization Detector.
 ppm = Parts per million.

[11; 42]

For each sample location, a compound or element is listed if it is detected at three times or greater than the reference sample concentration. However, if the compound or element is not detected in the reference sample (SS-01 or SS-02), the reference sample's SQL or SDL is used as the reference value. These compounds or elements are listed if they occurred at a value equal to or greater than the reference sample's SQL or SDL and are designated by their approximate relative concentration above these values. Table 11 summarizes the contaminants detected in surface soil samples collected by TtNUS team personnel on November 3, 1999.

Table 11

Summary of Analytical Results
Surface Soil Sample Analysis for Armstrong World Industries (former)
Samples Collected by TtNUS Team Personnel on November 3, 1999

| Sample Location | Compound/Element | Sample Concentration | Reference Concentration | Comments |
|-----------------|----------------------------|----------------------|-------------------------|------------|
| 08-SS-05 | VOCs | | | |
| (APL23) | Methyl acetate | 22 ppb | 19 U ppb | 1.1 × SQL |
| (MALF40) | SVOCs | | | |
| (D01283) | Acenaphthene | 390 ppb | 380 U ppb | 1 × SQL |
| | Anthracene | 480 ppb | 380 U ppb | 1.3 × SQL |
| | Benzo(a)anthracene | 2,000 ppb | 250 J ppb | 8 × REF |
| | Benzo(b)fluoranthene | 1,700 ppb | 220 J ppb | 7.7 × REF |
| | Benzo(k)fluoranthene | 1,200 ppb | 190 J ppb | 6.3 × REF |
| | Bis(2-ethylhexyl)phthalate | 2,100 ppb | 220 J ppb | 9.5 × REF |
| | Chrysene | 1,400 ppb | 250 J ppb | 5.6 × REF |
| | Fluoranthene | 3,600 ppb | 570 ppb | 6.3 × REF |
| | Fluorene | 400 ppb | 380 U ppb | 1 × SQL |
| | Phenanthrene | 2,800 ppb | 230 J ppb | 12.2 × REF |
| | Pyrene | 410 ppb | 76 J ppb | 5.4 × REF |
| | PESTICIDES | | | |
| | beta-BHC | 2.5 P ppb | 1.9 U ppb | 1.3 × SQL |
| | gamma-Chlordane | 9.9 P ppb | 2.3 P ppb | 4.3 × REF |
| | Endrin ketone | 14 ppb | 3.7 U ppb | 3.8 × SQL |
| | Heptachlor | 7.4 ppb | 1.9 U ppb | 3.9 × SQL |
| | Heptachlor epoxide | 12 P ppb | 1.9 U ppb | 6.3 × SQL |

SVOCs = Semivolatile organic compounds.

U = Compound was analyzed for but not detected.

P = Greater than 25% deviation between columns.

J = Estimated value below contract required quantitation limit.

REF = Reference sample concentration.

SQL = Sample quantitation limit.

ppb = Parts per billion.

[38; 39]

Analytical results of the surface soil samples indicated one VOC, 11 SVOCs, and five pesticides were detected. The contaminants were only detected in surface soil sample SS-05, which was collected from Fill Area #2. Concentrations ranged from 1 times the SQL (acenaphthene and fluorene) to 12.2 times the reference sample (phenanthrene). No metals or PCBs were detected in the surface soil samples [38-40].

Of the substances indicated in the table above, only gamma-chlordane, endrin ketone, and heptachlor epoxide were detected in the Monatiquot River through chemical analysis of sediment samples [40]. Based on the 1999 TtNUS sampling event, a release of hazardous substances to the surface soil has been documented. Hazardous substances detected in the surface soil sample SS-05 are most likely attributable to Fill Area #2 on the AWI property. Based on the distance to nearby residence (approximately 120 feet), and lack of public use of the AWI property, no impacts to nearby residential populations are known or suspected.

8.0 AIR MIGRATION PATHWAY

There are approximately 60 employees in the AWI building on the AWI property [34]. The nearest residents are located along Plain Street, bordering the southern portion of the AWI property [11]. There are no schools or day-care facilities within 200 feet of an area of observed contamination. The nearest school is located approximately 0.4 miles west of the AWI property [11; 16; 17]. An estimated 143,359 people, including the 60 workers, are located within 4-radial miles of the AWI property [19; 34]. Table 12 summarizes the estimated population within 4-radial miles of the AWI property.

Table 12

Estimated Population Within 4-Radial Miles of Armstrong World Industries (former)

| Radial Distance from Armstrong World Industries (former)(miles) | Estimated Population |
|---|----------------------|
| On Site | 60 |
| > 0.00 to 0.25 | 540 |
| > 0.25 to 0.50 | 1,357 |
| > 0.50 to 1.00 | 5,055 |
| > 1.00 to 2.00 | 22,037 |
| > 2.00 to 3.00 | 45,517 |
| > 3.00 to 4.00 | 68,793 |
| TOTAL | 143,359* |

+ Total includes on site workers.

[19; 34]

Approximately 1,837 acres of freshwater wetlands are located within 4-radial miles of the AWI property [23]. There are six State designated endangered species and five State designated threatened species located within 4-radial miles of the AWI property [25]. Table 13 summarizes the sensitive environments located within 4-radial miles of the AWI property.

Table 13
Sensitive Environments Within 4-Radial Miles of
Armstrong World Industries (former)

| Radial Distance from Armstrong World Industries (former) (miles) | Sensitive Environment/Species (status) |
|---|---|
| On Site | Clean Water Act |
| > 0.00 to 0.25 | 27 acres of wetlands |
| > 0.25 to 0.50 | 80 acres of wetlands |
| > 0.50 to 1.00 | 95 acres of wetlands |
| > 1.00 to 2.00 | 370 acres of wetlands |
| > 2.00 to 3.00 | 570 acres of wetlands 1 State-endangered species habitat |
| > 3.00 to 4.00 | 695 acres of wetlands 5 State-endangered species habitat 5 State-threatened species habitat |

[23; 25]

No laboratory qualitative air samples are known to have been collected from the AWI property. Based on the available data, no release of hazardous substances to the ambient air from on-site sources is known or suspected to have occurred and no impacts to nearby residential populations or sensitive environments are known or suspected.

9.0 SUMMARY

The Armstrong World Industries (AWI) property is located on approximately 35.5 acres at 10 Plain Street in Braintree, Norfolk County, Massachusetts. The following five sources, located on the AWI property, are used to evaluate this site: Fill Area #1, Fill Area #2, Fill Area #3, former dry well, and former lagoon.

An estimated 11,025 people receive drinking water from public groundwater wells within 4-radial miles of AWI. An estimated 267 people receive drinking water from private groundwater wells within 4-radial miles of AWI. The following substances were detected in groundwater samples collected by GEI Consultants, Inc. from the AWI property on March 26, 1993, at concentrations greater than or equal to three times the reference concentration or greater than or equal to the sample reporting limit of the reference sample: acetone, benzene, 2-butanone, butylbenzylphthalate, bis(2-ethylhexyl)phthalate, chloromethane, 1,1-dichloroethane, 1,1-dichloroethene, iron, lead, manganese, 4-methylphenol, nickel, phenol, toluene, and zinc.

The probable point of entry for the surface water pathway occurs approximately 10 feet north of the AWI building by the Monatiquot River. The 15-mile downstream surface water pathway includes the Monatiquot River, Weymouth Fore River, Hingham Bay, Hull Bay, Quincey Bay, and Boston Harbor. The terminus of the 15-mile downstream surface water pathway is located at a 7 mile arc from the Weymouth Fore River mouth into Hingham Bay, Hull Bay, Quincey Bay, and Boston Harbor.

On November 3, 1999, Tetra Tech NUS, Inc. (TtNUS) collected seven sediment samples from the Monatiquot River and analyzed the samples for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, and cyanide. The following substances were detected in sediment samples at concentrations greater than or equal to three times the reference sample or greater than or equal to the sample quantitation limit (SQL) or sample detection limit (SDL) of the reference sample: aldrin, antimony, Aroclor-1254, arsenic, barium, delta-BHC, gamma-BHC, cadmium, gamma-chlordane, chromium, copper, 4,4'-DDD, 4,4'DDE, dieldrin, 4,4'DDT, endosulfan II, endosulfan sulfate, endrin, endrin ketone, heptachlor epoxide, iron, lead, manganese, mercury, methoxychlor, nickel, selenium, sodium, thallium, vanadium, and zinc.

There are no on-site residents associated with the AWI property. The nearest residents are located along Plain Street, bordering the southern portion of the AWI property. TtNUS team personnel observed fences along the western and eastern borders of the AWI property and a fence surrounding Fill Area #3. However, there are no other barriers restricting access to the AWI property. There are no known terrestrial sensitive environments on the property. Approximately 60 people work on the property and an estimated 143,299 people live within 4-radial miles of the facility. There are no known schools or day-care facilities within 200 feet of an area of observed contamination on the property. The nearest school is located approximately 0.4 miles west of the AWI property.

On November 3, 1999, TtNUS collected six surface soil samples on the AWI property and analyzed the samples for VOCs, SVOCs, pesticides, PCBs, metals, and cyanide. The following substances were detected in sediment samples at concentrations greater than or equal to three times the reference sample or greater than or equal to the SQL or SDL of the reference sample: acenaphthene, anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, beta-BHC, bis(2-ethylhexyl)phthalate, gamma-chlordane, chrysene, endrin ketone, fluoranthene, fluorene, heptachlor, heptachlor epoxide, methyl acetate, phenanthrene, and pyrene.

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ATTACHMENT A

ARMSTRONG WORLD INDUSTRIES (FORMER)

SEDIMENT AND SURFACE SOIL

SAMPLE ANALYTICAL RESULTS

COLLECTED BY TETRA TECH NUS, INC.

Samples collected on November 3, 1999

Soil Semivolatile Organic Analysis (ug/kg)
Site: Armstrong World Industries
Case: 27546; SDG: APL19

UNVALIDATED DATA

| EPA Sample Number | APL19 | APL20 | APL21 | APL22 | APL23 |
|------------------------------|----------|----------|---------------------|---------------------|----------|
| Station Location | 08-SS-01 | 08-SS-03 | 08-SS-04 | 08-SS-DUP-01 | 08-SS-05 |
| Date Sampled | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 |
| Date Extracted | 11/11/99 | 11/11/99 | 11/11/99 | 11/11/99 | 11/11/99 |
| Date Analyzed | 12/3/99 | 12/3/99 | 12/3/99 | 12/3/99 | 12/3/99 |
| Dilution Factor | 1 | 1 | 1 | 1 | 1 |
| Percent Solids | 88.0 | 88.0 | 89.0 | 89.0 | 89.0 |
| QC Identifier | None | None | Field Dup. 08-SS-04 | Field Dup. 08-SS-04 | None |
| Benzaldehyde | 380 U | 380 U | 370 U | 370 U | 370 U |
| Caprolactam | 380 U | 380 U | 370 U | 370 U | 370 U |
| Phenol | 380 U | 380 U | 370 U | 370 U | 370 U |
| Bis(2-Chloroethyl)ether | 380 U | 380 U | 370 U | 370 U | 370 U |
| 2-Chlorophenol | 380 U | 380 U | 370 U | 370 U | 370 U |
| 2-Methylphenol | 380 U | 380 U | 370 U | 370 U | 370 U |
| 2,2'-oxybis(1-Chloropropane) | 380 U | 380 U | 370 U | 370 U | 370 U |
| 4-Methylphenol | 380 U | 380 U | 370 U | 370 U | 370 U |
| N-Nitroso-di-n-propylamine | 380 U | 380 U | 370 U | 370 U | 370 U |
| Hexachloroethane | 380 U | 380 U | 370 U | 370 U | 370 U |
| Nitrobenzene | 380 U | 380 U | 370 U | 370 U | 370 U |
| Isophorone | 380 U | 380 U | 370 U | 370 U | 370 U |
| 2-Nitrophenol | 380 U | 380 U | 370 U | 370 U | 370 U |
| 2,4-Dimethylphenol | 380 U | 380 U | 370 U | 370 U | 370 U |
| Bis(2-Chloroethoxy)methane | 380 U | 380 U | 370 U | 370 U | 370 U |
| 2,4-Dichlorophenol | 380 U | 380 U | 370 U | 370 U | 370 U |
| Naphthalene | 380 U | 380 U | 370 U | 370 U | 160 J |
| 4-Chloroaniline | 380 U | 380 U | 370 U | 370 U | 370 U |
| Hexachlorobutadiene | 380 U | 380 U | 370 U | 370 U | 370 U |
| 4-Chloro-3-methylphenol | 380 U | 380 U | 370 U | 370 U | 370 U |
| 2-Methylnaphthalene | 380 U | 380 U | 370 U | 370 U | 140 J |
| Hexachlorocyclopentadiene | 380 U | 380 U | 370 U | 370 U | 370 U |
| 2,4,6-Trichlorophenol | 380 U | 380 U | 370 U | 370 U | 370 U |
| 2,4,5-Trichlorophenol | 380 U | 380 U | 370 U | 370 U | 370 U |
| 2-Chloronaphthalene | 380 U | 380 U | 370 U | 370 U | 370 U |
| 2-Nitroaniline | 380 U | 380 U | 370 U | 370 U | 370 U |
| Dimethylphthalate | 380 U | 380 U | 370 U | 370 U | 370 U |
| Acenaphthylene | 380 U | 380 U | 370 U | 370 U | 370 U |
| 2,6-Dinitrotoluene | 380 U | 380 U | 370 U | 370 U | 370 U |
| 3-Nitroaniline | 380 U | 380 U | 370 U | 370 U | 370 U |
| Acenaphthene | 380 U | 380 U | 370 U | 370 U | 390 |
| 2,4-Dinitrophenol | 380 U | 380 U | 370 U | 370 U | 370 U |
| 4-Nitrophenol | 380 U | 380 U | 370 U | 370 U | 370 U |
| Dibenzofuran | 380 U | 380 U | 370 U | 370 U | 220 J |
| 2,4-Dinitrotoluene | 380 U | 380 U | 370 U | 370 U | 370 U |
| Diethylphthalate | 380 U | 380 U | 370 U | 370 U | 370 U |

Soil Semivolatile Organic Analysis (ug/kg)
 Site: Armstrong World Industries
 Case: 27546; SDG: APL19

UNVALIDATED DATA

| EPA Sample Number | APL19 | APL20 | APL21 | APL22 | APL23 |
|----------------------------|----------|----------|---------------------|---------------------|----------|
| Station Location | 08-SS-01 | 08-SS-03 | 08-SS-04 | 08-SS-DUP-01 | 08-SS-05 |
| Date Sampled | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 |
| Date Extracted | 11/11/99 | 11/11/99 | 11/11/99 | 11/11/99 | 11/11/99 |
| Date Analyzed | 12/3/99 | 12/3/99 | 12/3/99 | 12/3/99 | 12/3/99 |
| Dilution Factor | 1 | 1 | 1 | 1 | 1 |
| Percent Solids | 88.0 | 88.0 | 89.0 | 89.0 | 89.0 |
| QC Identifier | None | None | Field Dup. 08-SS-04 | Field Dup. 08-SS-04 | None |
| 4-Chlorophenyl-phenylether | 380 U | 380 U | 370 U | 370 U | 370 U |
| Fluorene | 380 U | 380 U | 370 U | 370 U | 400 |
| 4-Nitroaniline | 380 U | 380 U | 370 U | 370 U | 370 U |
| 4,6-Dinitro-2-methylphenol | 380 U | 380 U | 370 U | 370 U | 370 U |
| N-Nitroso-diphenylamine | 380 U | 380 U | 370 U | 370 U | 370 U |
| 4-Bromophenyl-phenylether | 380 U | 380 U | 370 U | 370 U | 370 U |
| Hexachlorobenzene | 380 U | 380 U | 370 U | 370 U | 370 U |
| Pentachlorophenol | 380 U | 380 U | 370 U | 370 U | 370 U |
| Phenanthrene | 230 J | 80 J | 370 U | 370 U | 2800 |
| Anthracene | 380 U | 380 U | 370 U | 370 U | 480 |
| Carbazole | 380 U | 380 U | 370 U | 370 U | 260 J |
| Di-n-Butylphthalate | 380 U | 380 U | 370 U | 370 U | 370 U |
| Fluoranthene | 570 | 140 J | 370 U | 89 J | 3400 D |
| Pyrene | 76 J | 380 U | 82 J | 370 U | 410 |
| Butylbenzylphthalate | 380 U | 380 U | 370 U | 370 U | 170 J |
| 3,3'-Dichlorobenzidine | 380 U | 380 U | 370 U | 370 U | 370 U |
| Benzo(a)anthracene | 250 J | 380 U | 370 U | 370 U | 2000 |
| Chrysene | 250 J | 380 U | 370 U | 370 U | 1400 |
| bis(2-Ethylhexyl)phthalate | 220 J | 170 J | 120 J | 75 J | 2100 |
| Di-n-octylphthalate | 380 U | 380 U | 370 U | 370 U | 370 U |
| Benzo(b)fluoranthene | 220 J | 380 U | 370 U | 370 U | 1700 |
| Benzo(k)fluoranthene | 190 J | 380 U | 370 U | 370 U | 1200 |
| Benzo(a)pyrene | 380 U | 380 U | 370 U | 370 U | 370 U |
| Indeno(1,2,3-cd)pyrene | 380 U | 380 U | 370 U | 370 U | 370 U |
| Dibenzo(a,h)anthracene | 380 U | 380 U | 370 U | 370 U | 250 J |
| Benzo(g,h,i)perylene | 380 U | 380 U | 370 U | 370 U | 370 U |
| 1,1'-Biphenyl | 380 U | 380 U | 370 U | 370 U | 370 U |
| Acetophenone | 380 U | 380 U | 370 U | 370 U | 370 U |
| Atrazine | 380 U | 380 U | 370 U | 370 U | 370 U |

Soil Pesticide/PCB Analysis (ug/kg)
 Site: Armstrong World Industries
 Case: 27546; SDG: APL19

UNVALIDATED DATA

| EPA Sample Number | APL19 | APL20 | APL21 | APL22 | APL23 |
|--------------------|----------|----------|---------------------|---------------------|----------|
| Station Location | 08-SS-01 | 08-SS-03 | 08-SS-04 | 08-SS-DUP-01 | 08-SS-05 |
| Date Sampled | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 |
| Date Extracted | 11/12/99 | 11/12/99 | 11/12/99 | 11/12/99 | 11/12/99 |
| Date Analyzed | 12/15/99 | 12/15/99 | 12/15/99 | 12/15/99 | 12/15/99 |
| Dilution Factor | 1 | 1 | 1 | 1 | 1 |
| Percent Solids | 88.0 | 88.0 | 89.0 | 89.0 | 89.0 |
| QC Identifier | None | None | Field Dup. 08-SS-04 | Field Dup. 08-SS-04 | None |
| alpha-BHC | 1.9 U | 1.9 U | 1.9 U | 1.9 U | 1.9 U |
| beta-BHC | 1.9 U | 1.9 U | 1.9 U | 1.9 U | 2.5 P |
| delta-BHC | 1.9 U | 1.9 U | 1.9 U | 1.9 U | 1.9 U |
| gamma-BHC | 1.9 U | 1.9 U | 1.9 U | 1.9 U | 1.9 U |
| Heptachlor | 1.9 U | 1.9 U | 1.9 U | 1.9 U | 7.4 |
| Aldrin | 1.9 U | 1.9 U | 1.9 U | 1.9 U | 1.9 U |
| Heptachlor Epoxide | 1.9 U | 1.9 U | 1.9 U | 1.9 U | 12 P |
| Endosulfan I | 1.9 U | 1.9 U | 1.9 U | 1.9 U | 1.9 U |
| Dieldrin | 3.7 U | 3.7 U | 3.7 U | 3.7 U | 3.7 U |
| 4,4'-DDE | 6.6 P | 3.7 U | 9.9 | 3.7 U | 17 |
| Endrin | 5.1 | 3.7 U | 1.9 JP | 3.7 U | 5.7 P |
| Endosulfan II | 3.7 U | 3.7 U | 3.7 U | 3.7 U | 3.7 U |
| 4,4'-DDD | 3.7 U | 3.7 U | 3.7 U | 3.7 U | 3.7 U |
| Endosulfan Sulfate | 3.7 U | 3.7 U | 3.7 U | 3.7 U | 3.7 U |
| 4,4'-DDT | 24 | 6.2 | 17 | 8.8 | 3.7 U |
| Methoxychlor | 19 U | 19 U | 19 U | 19 U | 19 U |
| Endrin Ketone | 3.7 U | 3.7 U | 3.7 U | 3.7 U | 14 |
| Endrin Aldehyde | 3.8 P | 3.7 U | 3.7 U | 3.7 U | 3.7 U |
| alpha-Chlordane | 5.2 | 1.9 U | 1.9 U | 1.9 U | 10 P |
| gamma-Chlordane | 2.3 P | 1.9 U | 1.9 U | 1.9 U | 10 P |
| Toxaphene | 190 U | 190 U | 190 U | 190 U | 190 U |
| Aroclor-1016 | 37 U | 37 U | 37 U | 37 U | 37 U |
| Aroclor-1221 | 76 U | 76 U | 75 U | 75 U | 75 U |
| Aroclor-1232 | 37 U | 37 U | 37 U | 37 U | 37 U |
| Aroclor-1242 | 37 U | 37 U | 37 U | 37 U | 37 U |
| Aroclor-1248 | 37 U | 37 U | 37 U | 37 U | 37 U |
| Aroclor-1254 | 37 U | 37 U | 37 U | 37 U | 37 U |
| Aroclor-1260 | 37 U | 37 U | 37 U | 37 U | 37 U |

Soil TAL Metal Analysis (mg/kg)
 Site: Armstrong World Industries
 Case: 27546; SDG: MAK48

UNVALIDATED DATA

| EPA Sample Number | MALF35 | MALF36 | MALF37 | MALF38 | MALF39 | MALF40 |
|-------------------|----------|----------|----------|---------------------|---------------------|----------|
| Station Location | 08-SS-01 | 08-SS-02 | 08-SS-03 | 08-SS-04 | 08-SS-DUP-01 | 08-SS-05 |
| Date Sampled | 11/3/99 | 11/4/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 |
| Date Extracted | | | | | | |
| Date Analyzed | | | | | | |
| Dilution Factor | 1 | 1 | 1 | 1 | 1 | 1 |
| Percent Solids | 78.1 | 87.3 | 88.6 | 91.8 | 91.5 | 91.5 |
| QC Identifier | None | None | None | Field Dup. 08-SS-04 | Field Dup. 08-SS-04 | None |
| Aluminum | 6630 | 6290 | 5430 | 4680 | 4410 | 4190 |
| Antimony | 0.90 B | 2.1 B | 0.47 U | 0.46 U | 2.7 B | 5.0 B |
| Arsenic | 2.6 | 4.1 | 1.8 B | 2.0 B | 2.4 | 4.9 |
| Barium | 58.2 | 134 | 21.2 B | 29.4 B | 20.3 B | 46.1 |
| Beryllium | 0.40 B | 0.47 B | 0.61 B | 0.59 B | 0.64 B | 0.33 B |
| Cadmium | 0.25 B | 0.76 B | 0.14 B | 0.07 U | 0.06 U | 0.85 B |
| Calcium | 935 B | 1110 B | 647 B | 798 B | 627 B | 3310 |
| Chromium | 7.6 | 12.2 | 6.8 | 6.9 | 5.5 | 17.5 |
| Cobalt | 3.9 B | 3.8 B | 3.5 B | 3.7 B | 3.9 B | 4.8 B |
| Copper | 15.1 | 40.9 | 7.8 | 8.2 | 9.0 | 38.5 |
| Iron | 9620 | 12700 | 8500 | 10300 | 10200 | 17300 |
| Lead | 136 | 359 | 14.2 | 21.7 | 16.0 | 111 |
| Magnesium | 1520 | 1660 | 1630 | 1660 | 1310 | 1910 |
| Manganese | 175 | 279 | 117 | 342 | 264 | 235 |
| Mercury | 0.06 U | 0.15 | 0.06 U | 0.09 B | 0.06 U | 0.08 B |
| Nickel | 7.7 B | 9.3 | 6.5 B | 6.3 B | 5.8 B | 12.2 |
| Potassium | 283 B | 262 B | 393 B | 333 B | 311 B | 351 B |
| Selenium | 0.45 U | 0.40 U | 0.41 U | 0.39 U | 0.39 U | 0.40 B |
| Silver | 0.20 B | 0.22 B | 0.09 B | 0.13 B | 0.13 B | 0.44 B |
| Sodium | 144 B | 148 B | 35.0 U | 33.8 U | 33.2 U | 132 B |
| Thallium | 0.53 U | 0.47 U | 0.47 U | 0.46 U | 0.45 U | 0.51 B |
| Vanadium | 21.8 | 27.6 | 15.0 | 11.4 | 10.2 B | 23.8 |
| Zinc | 84.2 | 284 | 59.4 | 83.5 | 77.0 | 285 |
| Cyanide | 0.23 B | NR | 0.11 B | 0.10 B | 0.19 B | 0.64 |

U - Not detected; B - Below CRDL; N - Spike %R > limit
 E - Estimated due to interference; * - From dilution analysis

Sediment Volatile Organic Analysis (ug/kg)
 Site: Armstrong World Industries
 Case: 0115H; SDG: D01284

UNVALIDATED DATA

| EPA Sample Number | D00271 | D01279 | D01280 | D01281 | D01282 | D01283 | D01284 | D01285 |
|---------------------------------------|------------|----------|----------|---------------------|---------------------|----------|----------|---------------------|
| Station Location | 08-TB-03 | 08-SS-01 | 08-SS-03 | 08-SS-04 | 08-SS-DUP-01 | 08-SS-05 | 08-SD-01 | 08-SD-03 |
| Date Sampled | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 |
| Date Extracted | | | | | | | | |
| Date Analyzed | 11/10/99 | 11/10/99 | 11/10/99 | 11/15/99 | 11/10/99 | 11/10/99 | 11/10/99 | 11/10/99 |
| Dilution Factor | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Percent Solids | 0.0 | 72.0 | 90.0 | 91.0 | 81.0 | 93.0 | 63.0 | 92.0 |
| QC Identifier | Trip Blank | None | None | Field Dup. 08-SS-04 | Field Dup. 08-SS-04 | None | None | Field Dup. 08-SD-03 |
| Methyl Acetate | 10 U | 19 U | 11 U | 10 U | 10 U | 22 | 18 U | 10 U |
| Methylcyclohexane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| cis-1,2-Dichloroethene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| trans-1,2-Dichloroethene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Chloromethane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Dichlorodifluoromethane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Bromomethane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Vinyl Chloride | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| 1,3-Dichlorobenzene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Chloroethane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| 1,4-Dichlorobenzene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Methylene Chloride | 3 JB | 5 JB | 2 JB | 1 JB | 2 JB | 2 JB | 3 JB | 2 JB |
| 1,2-Dichlorobenzene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Acetone | 3 JB | 140 B | 44 B | 55 B | 67 B | 35 B | 69 B | 16 B |
| Trichlorofluoromethane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Carbon Disulfide | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 4 J | 2 J |
| 1,1-Dichloroethene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| 1,1-Dichloroethane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Chloroform | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| 1,2-Dichloroethane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| 2-Butanone | 10 U | 12 J | 4 J | 8 J | 12 | 12 | 18 | 2 J |
| 1,1,1-Trichloroethane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Carbon Tetrachloride | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Bromodichloromethane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| 1,2,4-Trichlorobenzene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| 1,2-Dichloropropane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| cis-1,3-Dichloropropene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Trichloroethene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Dibromochloromethane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| 1,1,2-Trichloroethane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Benzene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| trans-1,3-Dichloropropene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Bromoform | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| 4-Methyl-2-Pentanone | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| 2-Hexanone | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |

U - Not detected; J - Estimated value below CRQL; E - Conc. > calib. range;
 B - In lab blank; * - Result from dilution analysis; P - >25%D between columns

Sediment Volatile Organic Analysis (ug/kg)

Site: Armstrong World Industries

Case: 0115H; SDG: D01284

UNVALIDATED DATA

| EPA Sample Number | D00271 | D01279 | D01280 | D01281 | D01282 | D01283 | D01284 | D01285 |
|-----------------------------|------------|----------|----------|---------------------|---------------------|----------|----------|---------------------|
| Station Location | 08-TB-03 | 08-SS-01 | 08-SS-03 | 08-SS-04 | 08-SS-DUP-01 | 08-SS-05 | 08-SD-01 | 08-SD-03 |
| Date Sampled | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 |
| Date Extracted | | | | | | | | |
| Date Analyzed | 11/10/99 | 11/10/99 | 11/10/99 | 11/15/99 | 11/10/99 | 11/10/99 | 11/10/99 | 11/10/99 |
| Dilution Factor | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Percent Solids | 0.0 | 72.0 | 90.0 | 91.0 | 81.0 | 93.0 | 63.0 | 92.0 |
| QC Identifier | Trip Blank | None | None | Field Dup. 08-SS-04 | Field Dup. 08-SS-04 | None | None | Field Dup. 08-SD-03 |
| Tetrachloroethene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| 1,1,2,2-Tetrachloroethane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Toluene | 10 U | 19 U | 1 J | 10 U | 10 U | 10 U | 18 U | 10 U |
| Chlorobenzene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Ethylbenzene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Styrene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Total Xylenes | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Methyl tert-Butyl Ether | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| 1,2-Dibromoethane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Isopropylbenzene | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| Cyclohexane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |
| 1,2-Dibromo-3-chloropropane | 10 U | 19 U | 11 U | 10 U | 10 U | 10 U | 18 U | 10 U |

U - Not detected; J - Estimated value below CRQL; E - Conc. > calib. range;

B - In lab blank; * - Result from dilution analysis; P - >25%D between columns

Sediment Volatile Organic Analysis (ug/kg)
Site: Armstrong World Industries
Case: 0115H; SDG: D01284

UNVALIDATED DATA

| EPA Sample Number | D01286 | D01287 | D01288 | D01289 |
|---------------------------------------|---------------------|----------|----------|----------|
| Station Location | 08-SD-DUP-01 | 08-SD-04 | 08-SD-05 | 08-SD-06 |
| Date Sampled | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 |
| Date Extracted | | | | |
| Date Analyzed | 11/10/99 | 11/10/99 | 11/10/99 | 11/10/99 |
| Dilution Factor | 1 | 1 | 1 | 1 |
| Percent Solids | 69.0 | 78.0 | 74.0 | 61.0 |
| QC Identifier | Field Dup. 08-SD-03 | None | None | None |
| Methyl Acetate | 12 U | 9 U | 10 U | 23 U |
| Methylcyclohexane | 12 U | 9 U | 10 U | 23 U |
| cis-1,2-Dichloroethene | 12 U | 9 U | 10 U | 23 U |
| trans-1,2-Dichloroethene | 12 U | 9 U | 10 U | 23 U |
| Chloromethane | 12 U | 9 U | 10 U | 23 U |
| Dichlorodifluoromethane | 12 U | 9 U | 10 U | 23 U |
| Bromomethane | 12 U | 9 U | 10 U | 23 U |
| Vinyl Chloride | 12 U | 9 U | 10 U | 23 U |
| 1,3-Dichlorobenzene | 12 U | 9 U | 10 U | 23 U |
| Chloroethane | 12 U | 9 U | 10 U | 23 U |
| 1,4-Dichlorobenzene | 12 U | 9 U | 10 U | 23 U |
| Methylene Chloride | 2 JB | 2 JB | 2 JB | 5 JB |
| 1,2-Dichlorobenzene | 12 U | 9 U | 10 U | 23 U |
| Acetone | 54 B | 81 B | 37 B | 200 B |
| Trichlorofluoromethane | 12 U | 9 U | 10 U | 23 U |
| Carbon Disulfide | 4 J | 3 J | 4 J | 9 J |
| 1,1-Dichloroethene | 12 U | 9 U | 10 U | 23 U |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 12 U | 9 U | 10 U | 23 U |
| 1,1-Dichloroethane | 12 U | 9 U | 10 U | 23 U |
| Chloroform | 12 U | 9 U | 10 U | 23 U |
| 1,2-Dichloroethane | 12 U | 9 U | 10 U | 23 U |
| 2-Butanone | 15 | 11 | 6 J | 31 |
| 1,1,1-Trichloroethane | 12 U | 9 U | 10 U | 23 U |
| Carbon Tetrachloride | 12 U | 9 U | 10 U | 23 U |
| Bromodichloromethane | 12 U | 9 U | 10 U | 23 U |
| 1,2,4-Trichlorobenzene | 12 U | 9 U | 10 U | 23 U |
| 1,2-Dichloropropane | 12 U | 9 U | 10 U | 23 U |
| cis-1,3-Dichloropropene | 12 U | 9 U | 10 U | 23 U |
| Trichloroethene | 12 U | 9 U | 10 U | 23 U |
| Dibromochloromethane | 12 U | 9 U | 10 U | 23 U |
| 1,1,2-Trichloroethane | 12 U | 9 U | 10 U | 23 U |
| Benzene | 12 U | 9 U | 10 U | 23 U |
| trans-1,3-Dichloropropene | 12 U | 9 U | 10 U | 23 U |
| Bromoform | 12 U | 9 U | 10 U | 23 U |
| 4-Methyl-2-Pentanone | 12 U | 9 U | 2 J | 23 U |
| 2-Hexanone | 12 U | 9 U | 10 U | 23 U |

U - Not detected; J - Estimated value below CRQL; E - Conc. > calib. range;
B - In lab blank; * - Result from dilution analysis; P - >25%D between columns

Sediment Volatile Organic Analysis (ug/kg)
 Site: Armstrong World Industries
 Case: 0115H; SDG: D01284

UNVALIDATED DATA

| EPA Sample Number | D01286 | D01287 | D01288 | D01289 |
|-----------------------------|---------------------|----------|----------|----------|
| Station Location | 08-SD-DUP-01 | 08-SD-04 | 08-SD-05 | 08-SD-06 |
| Date Sampled | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 |
| Date Extracted | | | | |
| Date Analyzed | 11/10/99 | 11/10/99 | 11/10/99 | 11/10/99 |
| Dilution Factor | 1 | 1 | 1 | 1 |
| Percent Solids | 69.0 | 78.0 | 74.0 | 61.0 |
| QC Identifier | Field Dup. 08-SD-03 | None | None | None |
| Tetrachloroethene | 12 U | 9 U | 10 U | 23 U |
| 1,1,2,2-Tetrachloroethane | 12 U | 9 U | 10 U | 23 U |
| Toluene | 2 J | 9 U | 10 U | 3 J |
| Chlorobenzene | 12 U | 9 U | 10 U | 23 U |
| Ethylbenzene | 12 U | 9 U | 10 U | 23 U |
| Styrene | 12 U | 9 U | 10 U | 23 U |
| Total Xylenes | 12 U | 9 U | 10 U | 23 U |
| Methyl tert-Butyl Ether | 12 U | 9 U | 10 U | 23 U |
| 1,2-Dibromoethane | 12 U | 9 U | 10 U | 23 U |
| Isopropylbenzene | 12 U | 9 U | 10 U | 23 U |
| Cyclohexane | 12 U | 9 U | 10 U | 23 U |
| 1,2-Dibromo-3-chloropropane | 12 U | 9 U | 10 U | 23 U |

Aqueous Volatile Organic Analysis (ug/l)
 Site: Armstrong World Industries
 Case: 0115H; SDG: D01284

UNVALIDATED DATA

| | | |
|---------------------------------------|---------------|------------|
| EPA Sample Number | D00272 | D01300 |
| Station Location | 08-RB-01 | 08-TB-01 |
| Date Sampled | 11/4/99 | 11/3/99 |
| Date Extracted | | |
| Date Analyzed | 11/10/99 | 11/10/99 |
| Dilution Factor | 1 | 1 |
| Percent Solids | 0.0 | 0.0 |
| QC Identifier | Rinsate Blank | Trip Blank |
| Methyl Acetate | 10 U | 10 U |
| Methylcyclohexane | 10 U | 10 U |
| cis-1,2-Dichloroethene | 10 U | 10 U |
| trans-1,2-Dichloroethene | 10 U | 10 U |
| Chloromethane | 10 U | 10 U |
| Dichlorodifluoromethane | 10 U | 10 U |
| Bromomethane | 10 U | 10 U |
| Vinyl Chloride | 10 U | 10 U |
| 1,3-Dichlorobenzene | 10 U | 10 U |
| Chloroethane | 10 U | 10 U |
| 1,4-Dichlorobenzene | 10 U | 10 U |
| Methylene Chloride | 10 U | 10 U |
| 1,2-Dichlorobenzene | 10 U | 10 U |
| Acetone | 2 J | 1 J |
| Trichlorofluoromethane | 10 U | 10 U |
| Carbon Disulfide | 10 U | 10 U |
| 1,1-Dichloroethene | 10 U | 10 U |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 10 U | 10 U |
| 1,1-Dichloroethane | 10 U | 10 U |
| Chloroform | 10 U | 10 U |
| 1,2-Dichloroethane | 10 U | 10 U |
| 2-Butanone | 10 U | 10 U |
| 1,1,1-Trichloroethane | 10 U | 10 U |
| Carbon Tetrachloride | 10 U | 10 U |
| Bromodichloromethane | 10 U | 10 U |
| 1,2,4-Trichlorobenzene | 10 U | 10 U |
| 1,2-Dichloropropane | 10 U | 10 U |
| cis-1,3-Dichloropropene | 10 U | 10 U |
| Trichloroethene | 10 U | 10 U |
| Dibromochloromethane | 10 U | 10 U |
| 1,1,2-Trichloroethane | 10 U | 10 U |
| Benzene | 10 U | 10 U |
| trans-1,3-Dichloropropene | 10 U | 10 U |
| Bromoform | 10 U | 10 U |
| 4-Methyl-2-Pentanone | 10 U | 10 U |
| 2-Hexanone | 10 U | 10 U |

Aqueous Volatile Organic Analysis (ug/l)
 Site: Armstrong World Industries
 Case: 0115H; SDG: D01284

UNVALIDATED DATA

| | | |
|-----------------------------|---------------|------------|
| EPA Sample Number | D00272 | D01300 |
| Station Location | 08-RB-01 | 08-TB-01 |
| Date Sampled | 11/4/99 | 11/3/99 |
| Date Extracted | | |
| Date Analyzed | 11/10/99 | 11/10/99 |
| Dilution Factor | 1 | 1 |
| Percent Solids | 0.0 | 0.0 |
| QC Identifier | Rinsate Blank | Trip Blank |
| Tetrachloroethene | 10 U | 10 U |
| 1,1,2,2-Tetrachloroethane | 10 U | 10 U |
| Toluene | 10 U | 10 U |
| Chlorobenzene | 10 U | 10 U |
| Ethylbenzene | 10 U | 10 U |
| Styrene | 10 U | 10 U |
| Total Xylenes | 10 U | 10 U |
| Methyl tert-Butyl Ether | 10 U | 10 U |
| 1,2-Dibromoethane | 10 U | 10 U |
| Isopropylbenzene | 10 U | 10 U |
| Cyclohexane | 10 U | 10 U |
| 1,2-Dibromo-3-chloropropane | 10 U | 10 U |

Aqueous Semivolatile Organic Analysis (ug/l)
 Site: Armstrong World Industries
 Case: 0115H; SDG: D01284

UNVALIDATED DATA

| | | |
|------------------------------|---------------|---|
| EPA Sample Number | D00272 | |
| Station Location | 08-RB-01 | |
| Date Sampled | 11/4/99 | |
| Date Extracted | 11/8/99 | |
| Date Analyzed | 12/15/99 | |
| Dilution Factor | 1 | |
| Percent Solids | 0.0 | |
| QC Identifier | Rinsate Blank | |
| Benzaldehyde | 10 | U |
| Caprolactam | 10 | U |
| Phenol | 10 | U |
| Bis(2-Chloroethyl)ether | 10 | U |
| 2-Chlorophenol | 10 | U |
| 2-Methylphenol | 10 | U |
| 2,2'-oxybis(1-Chloropropane) | 10 | U |
| 4-Methylphenol | 10 | U |
| N-Nitroso-di-n-propylamine | 10 | U |
| Hexachloroethane | 10 | U |
| Nitrobenzene | 10 | U |
| Isophorone | 10 | U |
| 2-Nitrophenol | 10 | U |
| 2,4-Dimethylphenol | 10 | U |
| Bis(2-Chloroethoxy)methane | 10 | U |
| 2,4-Dichlorophenol | 10 | U |
| Naphthalene | 10 | U |
| 4-Chloroaniline | 10 | U |
| Hexachlorobutadiene | 10 | U |
| 4-Chloro-3-methylphenol | 10 | U |
| 2-Methylnaphthalene | 10 | U |
| Hexachlorocyclopentadiene | 10 | U |
| 2,4,6-Trichlorophenol | 10 | U |
| 2,4,5-Trichlorophenol | 25 | U |
| 2-Chloronaphthalene | 10 | U |
| 2-Nitroaniline | 25 | U |
| Dimethylphthalate | 10 | U |
| Acenaphthylene | 10 | U |
| 2,6-Dinitrotoluene | 10 | U |
| 3-Nitroaniline | 25 | U |
| Acenaphthene | 10 | U |
| 2,4-Dinitrophenol | 25 | U |
| 4-Nitrophenol | 25 | U |
| Dibenzofuran | 10 | U |
| 2,4-Dinitrotoluene | 10 | U |
| Diethylphthalate | 10 | U |

Aqueous Semivolatile Organic Analysis (ug/l)
 Site: Armstrong World Industries
 Case: 0115H; SDG: D01284

UNVALIDATED DATA

| | | |
|----------------------------|---------------|---|
| EPA Sample Number | D00272 | |
| Station Location | 08-RB-01 | |
| Date Sampled | 11/4/99 | |
| Date Extracted | 11/8/99 | |
| Date Analyzed | 12/15/99 | |
| Dilution Factor | 1 | |
| Percent Solids | 0.0 | |
| QC Identifier | Rinsate Blank | |
| 4-Chlorophenyl-phenylether | 10 | U |
| Fluorene | 10 | U |
| 4-Nitroaniline | 25 | U |
| 4,6-Dinitro-2-methylphenol | 25 | U |
| N-Nitroso-diphenylamine | 10 | U |
| 4-Bromophenyl-phenylether | 10 | U |
| Hexachlorobenzene | 10 | U |
| Pentachlorophenol | 25 | U |
| Phenanthrene | 10 | U |
| Anthracene | 10 | U |
| Carbazole | 10 | U |
| Di-n-Butylphthalate | 10 | U |
| Fluoranthene | 10 | U |
| Pyrene | 10 | U |
| Butylbenzylphthalate | 10 | U |
| 3,3'-Dichlorobenzidine | 10 | U |
| Benzo(a)anthracene | 10 | U |
| Chrysene | 10 | U |
| bis(2-Ethylhexyl)phthalate | 10 | U |
| Di-n-octylphthalate | 10 | U |
| Benzo(b)fluoranthene | 10 | U |
| Benzo(k)fluoranthene | 10 | U |
| Benzo(a)pyrene | 10 | U |
| Indeno(1,2,3-cd)pyrene | 10 | U |
| Dibenzo(a,h)anthracene | 10 | U |
| Benzo(g,h,i)perylene | 10 | U |
| 1,1'-Biphenyl | 10 | U |
| Acetophenone | 10 | U |
| Atrazine | 10 | U |

Sediment Pesticide/PCB Analysis (ug/kg)

Site: Armstrong World Industries

Case: 0115H; SDG: D01284

UNVALIDATED DATA

| EPA Sample Number | D01284 | D01285 | D01286 | D01287 | D01288 | D01289 |
|--------------------|----------|---------------------|---------------------|----------|----------|----------|
| Station Location | 08-SD-01 | 08-SD-03 | 08-SD-DUP-01 | 08-SD-04 | 08-SD-05 | 08-SD-06 |
| Date Sampled | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 |
| Date Extracted | 11/15/99 | 11/15/99 | 11/15/99 | 11/15/99 | 11/15/99 | 11/15/99 |
| Date Analyzed | 12/12/99 | 12/12/99 | 12/12/99 | 12/12/99 | 12/12/99 | 12/12/99 |
| Dilution Factor | 1 | 1 | 1 | 1 | 1 | 1 |
| Percent Solids | 63.0 | 86.0 | 66.0 | 76.0 | 74.0 | 65.0 |
| QC Identifier | None | Field Dup. 08-SD-03 | Field Dup. 08-SD-03 | None | None | None |
| alpha-BHC | 1.6 U | 1.7 U | 1.5 U | 1.7 U | 1.7 U | 1.6 U |
| beta-BHC | 1.6 U | 1.7 U | 1.5 U | 1.7 U | 1.7 U | 1.6 U |
| delta-BHC | 1.6 U | 8.3 P | 1.5 U | 3.2 P | 1.7 U | 1.6 U |
| gamma-BHC | 1.6 U | 3.9 | 23 P | 1.7 U | 1.7 U | 1.6 U |
| Heptachlor | 1.6 U | 1.7 U | 1.5 U | 1.7 U | 1.7 U | 1.6 U |
| Aldrin | 1.6 U | 1.7 U | 1.5 U | 1.7 U | 1.7 U | 4.2 P |
| Heptachlor Epoxide | 1.6 U | 1.7 U | 1.6 P | 1.7 U | 1.7 U | 1.6 U |
| Endosulfan I | 1.6 U | 1.7 U | 1.5 U | 1.7 U | 1.7 U | 1.6 U |
| Dieldrin | 3.1 U | 3.3 U | 18 P | 3.3 U | 4.9 P | 3.0 U |
| 4,4'-DDE | 3.1 U | 3.3 U | 5.7 P | 3.3 U | 3.3 U | 3.0 U |
| Endrin | 3.1 U | 3.3 U | 3.0 U | 3.3 U | 3.3 U | 20 P |
| Endosulfan II | 3.1 U | 3.3 U | 16 P | 3.3 U | 3.3 U | 17 P |
| 4,4'-DDD | 8.9 | 3.3 U | 32 P | 3.3 U | 3.3 U | 28 P |
| Endosulfan Sulfate | 3.1 U | 3.3 U | 37 P | 3.3 U | 3.3 U | 17 P |
| 4,4'-DDT | 3.1 U | 3.3 U | 3.0 U | 3.3 U | 3.3 U | 6.0 |
| Methoxychlor | 16 U | 17 U | 15 U | 17 U | 17 U | 39 P |
| Endrin Ketone | 3.1 U | 3.3 U | 3.0 U | 3.3 U | 3.3 U | 14 P |
| Endrin Aldehyde | 3.1 U | 3.3 U | 3.0 U | 3.3 U | 3.3 U | 3.0 U |
| alpha-Chlordane | 1.6 U | 1.7 U | 1.5 U | 1.7 U | 1.7 U | 1.6 U |
| gamma-Chlordane | 1.6 U | 1.7 U | 2.3 P | 1.7 U | 3.3 | 3.2 P |
| Toxaphene | 160 U | 170 U | 150 U | 170 U | 170 U | 160 U |
| Aroclor-1016 | 31 U | 33 U | 30 U | 33 U | 33 U | 30 U |
| Aroclor-1221 | 64 U | 66 U | 60 U | 66 U | 67 U | 62 U |
| Aroclor-1232 | 31 U | 33 U | 30 U | 33 U | 33 U | 30 U |
| Aroclor-1242 | 31 U | 33 U | 30 U | 33 U | 33 U | 30 U |
| Aroclor-1248 | 31 U | 33 U | 30 U | 33 U | 33 U | 30 U |
| Aroclor-1254 | 31 U | 33 U | 30 U | 33 U | 250 P | 190 P |
| Aroclor-1260 | 31 U | 33 U | 30 U | 33 U | 33 U | 30 U |

U - Not detected; J - Estimated value below CRQL; E - Conc. > calib. range;

B - In lab blank; * - Result from dilution analysis; P - >25%D between columns

Aqueous Pesticide/PCB Analysis (ug/l)
 Site: Armstrong World Industries
 Case: 0115H; SDG: D01284

UNVALIDATED DATA

| | | |
|--------------------|---------------|---|
| EPA Sample Number | D00272 | |
| Station Location | 08-RB-01 | |
| Date Sampled | 11/4/99 | |
| Date Extracted | 11/10/99 | |
| Date Analyzed | 12/15/99 | |
| Dilution Factor | 1 | |
| Percent Solids | 0.0 | |
| QC Identifier | Rinsate Blank | |
| alpha-BHC | 0.05 | U |
| beta-BHC | 0.05 | U |
| delta-BHC | 0.05 | U |
| gamma-BHC | 0.05 | U |
| Heptachlor | 0.05 | U |
| Aldrin | 0.05 | U |
| Heptachlor Epoxide | 0.05 | U |
| Endosulfan I | 0.05 | U |
| Dieldrin | 0.10 | U |
| 4,4'-DDE | 0.10 | U |
| Endrin | 0.10 | U |
| Endosulfan II | 0.10 | U |
| 4,4'-DDD | 0.10 | U |
| Endosulfan Sulfate | 0.10 | U |
| 4,4'-DDT | 0.10 | U |
| Methoxychlor | 0.50 | U |
| Endrin Ketone | 0.10 | U |
| Endrin Aldehyde | 0.10 | U |
| alpha-Chlordane | 0.05 | U |
| gamma-Chlordane | 0.05 | U |
| Toxaphene | 5.0 | U |
| Aroclor-1016 | 1.0 | U |
| Aroclor-1221 | 2.0 | U |
| Aroclor-1232 | 1.0 | U |
| Aroclor-1242 | 1.0 | U |
| Aroclor-1248 | 1.0 | U |
| Aroclor-1254 | 1.0 | U |
| Aroclor-1260 | 1.0 | U |

Sediment TAL Metal Analysis (mg/kg)
 Site: Armstrong World Industries
 Case: 0115H; SDG: D01284

UNVALIDATED DATA

| EPA Sample Number | D01284 | D01285 | D01286 | D01287 | D01288 | D01289 | D01290 |
|-------------------|----------|---------------------|---------------------|----------|----------|----------|----------|
| Station Location | 08-SD-01 | 08-SD-03 | 08-SD-DUP-01 | 08-SD-04 | 08-SD-05 | 08-SD-06 | 08-SD-02 |
| Date Sampled | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 | 11/3/99 |
| Date Extracted | | | | | | | |
| Date Analyzed | | | | | | | |
| Dilution Factor | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Percent Solids | 63.0 | 86.0 | 66.0 | 76.0 | 74.0 | 65.0 | 56.0 |
| QC Identifier | None | Field Dup. 08-SD-03 | Field Dup. 08-SD-03 | None | None | None | None |
| Aluminum | 3110 * | 4720 * | 6190 * | 3830 * | 2880 * | 3260 * | 3870 * |
| Antimony | 0.28 UN | 0.36 UN | 0.21 UN | 0.37 UN | 0.31 UN | 2.6 NB | 0.34 UN |
| Arsenic | 1.6 | 2.0 | 2.4 | 2.8 | 3.3 | 9.9 | 2.7 |
| Barium | 26.2 B | 29.0 B | 86.2 | 61.9 | 26.7 B | 111 | 35.3 |
| Beryllium | 0.29 B | 0.20 B | 0.33 B | 0.32 B | 0.29 B | 0.21 B | 0.36 B |
| Cadmium | 0.014 U | 0.018 U | 8.5 | 0.018 U | 0.016 U | 2.3 | 0.017 U |
| Calcium | 796 | 415 B | 1170 | 824 B | 624 B | 1460 | 1320 |
| Chromium | 5.7 | 9.4 | 28.6 | 12.2 | 7.6 | 61.8 | 19.0 |
| Cobalt | 3.7 B | 4.2 B | 5.5 | 4.3 B | 3.9 B | 7.0 B | 5.0 B |
| Copper | 8.6 N | 7.4 N | 56.5 N | 12.4 N | 14.9 N | 1160 N | 28.1 N |
| Iron | 5970 | 12600 | 13300 | 12200 | 10400 | 36500 | 11800 |
| Lead | 24.8 N*E | 12.7 N*E | 46.9 N*E | 22.7 N*E | 31.8 N*E | 669 N*E | 65.3 N*E |
| Magnesium | 1170 | 1430 | 3210 | 1560 | 1160 | 1260 | 2010 |
| Manganese | 215 * | 346 * | 245 * | 1310 * | 415 * | 447 * | 281 * |
| Mercury | 0.054 B | 0.035 U | 0.045 B | 0.044 B | 0.038 U | 1.4 | 0.054 B |
| Nickel | 6.5 E | 10.0 E | 13.2 E | 8.9 E | 8.7 E | 58.3 E | 13.1 E |
| Potassium | 134 B | 154 B | 147 B | 119 B | 177 B | 174 B | 246 B |
| Selenium | 0.78 N | 1.8 N | 1.1 N | 1.7 N | 1.3 N | 5.7 N | 0.98 N |
| Silver | 0.14 U | 0.27 B | 0.10 U | 0.25 B | 0.20 B | 0.64 B | 0.29 B |
| Sodium | 18.7 U | 23.8 U | 41.0 B | 24.7 U | 21.1 U | 272 B | 22.6 U |
| Thallium | 0.56 U | 0.71 U | 0.41 U | 0.74 U | 0.63 U | 0.68 B | 0.67 U |
| Vanadium | 11.4 * | 16.1 * | 30.4 * | 14.1 * | 14.4 * | 122 * | 16.2 * |
| Zinc | 49.7 N* | 54.9 N* | 774 N* | 106 N* | 120 N* | 743 N* | 119 N* |
| Cyanide | 0.017 B | 0.056 U | 0.051 B | 0.15 B | 0.043 B | 0.18 | 0.074 B |

U - Not detected; B - Below CRDL; N - Spike %R > limit
 E - Estimated due to interference; * - From dilution analysis

Aqueous TAL Metal Analysis (ug/l)
 Site: Armstrong World Industries
 Case: 0115H; SDG: D01284

UNVALIDATED DATA

| | | |
|-------------------|---------------|---|
| EPA Sample Number | D00272 | |
| Station Location | 08-RB-01 | |
| Date Sampled | 11/4/99 | |
| Date Extracted | | |
| Date Analyzed | | |
| Dilution Factor | 1 | |
| Percent Solids | 0.0 | |
| QC Identifier | Rinsate Blank | |
| Aluminum | 20.0 | U |
| Antimony | 2.0 | U |
| Arsenic | 4.0 | U |
| Barium | 11.5 | B |
| Beryllium | 0.20 | U |
| Cadmium | 0.89 | B |
| Calcium | 203 | U |
| Chromium | 0.73 | B |
| Cobalt | 0.95 | B |
| Copper | 37.3 | E |
| Iron | 69.0 | B |
| Lead | 7.1 | |
| Magnesium | 4.0 | U |
| Manganese | 4.3 | B |
| Mercury | 0.097 | U |
| Nickel | 1.2 | B |
| Potassium | 74.0 | U |
| Selenium | 7.3 | |
| Silver | 1.0 | B |
| Sodium | 134 | U |
| Thallium | 5.2 | B |
| Vanadium | 0.40 | U |
| Zinc | 40.1 | |
| Cyanide | 1.0 | U |

ATTACHMENT B
ARMSTRONG WORLD INDUSTRIES (FORMER)
GEOGRAPHIC COORDINATES FOR
SEDIMENT AND SURFACE SOIL SAMPLES
COLLECTED BY TETRA TECH NUS, INC.

Sample locations globally positioned on November 3, 1999

Attachment B
Armstrong World Industries (former)
Global Positioning System

| Collection Sequence | Sample Location | West Longitude | North Latitude | Elevation (meters) |
|---------------------|---------------------------|----------------|----------------|--------------------|
| 1 | joseph st lawrence bridge | 70 59 50.1 | 42 12 12.3 | 17.918 |
| 2 | sd-05 | 70 59 50.1 | 42 12 11.3 | 14.006 |
| 3 | sd-04 | 71 00 09.5 | 42 11 58.7 | 23.924 |
| 4 | sd-03 | 71 00 11.0 | 42 11 56.5 | 22.899 |
| 5 | sd-dup-01 | 71 00 11.1 | 42 11 56.5 | 22.145 |
| 6 | sd-06 | 71 00 12.3 | 42 11 55.0 | 23.429 |
| 7 | drain from wetlands | 71 00 15.6 | 42 11 44.7 | 27.302 |
| 8 | sd-02 | 71 00 15.6 | 42 11 44.8 | 26.187 |
| 9 | sd-01 | 71 00 15.8 | 42 11 45.0 | 27.616 |
| 10 | ss-05 | 71 00 09.5 | 42 11 59.6 | 23.255 |
| 11 | ss-04 | 71 00 08.5 | 42 11 58.5 | 24.967 |
| 12 | ss-dup-01 | 71 00 08.5 | 42 11 58.5 | 26.175 |
| 13 | ss-03 | 71 00 09.2 | 42 11 56.8 | 27.059 |
| 14 | ss-03b | 71 00 09.2 | 42 11 56.9 | 27.608 |
| 15 | ss-01 | 71 00 02.4 | 42 11 49.3 | 32.141 |
| 16 | ss-02 | 71 00 02.1 | 42 11 49.3 | 31.504 |

Note: Sample locations were logged using a Trimble Global Positioning System (GPS) data logger model TSC1 PN 29673-50, SN 0220167399. The GPS data was downloaded using Pathfinder Office 2.02 software. Sample locations globally positioned on November 3, 1999. Data was 3-D corrected.